Instruction Manual

DC100
Data Collector

DARWIN

IM DC100-01E

YOKOGAWA
Yokogawa Electric Corporation

IM DC100-01E
6th Edition

Foreword

Thank you for purchasing the YOKOGAWA Data Collector DC100.
This User's Manual contains useful information regarding the instrument's functions and operating procedures, as well as precautions that should be observed during use. To ensure proper use of the instrument, please read this manual thoroughly before operating the instrument.
Keep the manual in a safe place for quick reference whenever a question arises.
The following manual is provided with the instrument in addition to this manual.

Manual Name	Manual No.
DC100 Communication Interface	IMDC100-11E
DC100 Viewer Software	IMDP15013-61E

Notes

- DARWIN is a system comprising a number of data-acquisition equipment components. In the course of system growth, new models, software, various input/output modules and optional features are added to the family to enhance the systems expandability and flexibility. You can check the versions of your equipment and software by referring to the style number (Sn) and release number (Rn) respectively which are shown on the nameplate of the main unit.
  When configuring a system, you must confirm that the style number of each component unit and software meets the following requirements:
  1 the style number of each input/output module must be the same as or lower than that of the main unit or subunit to which the module is connected.
  2 the release number of a dedicated software package must be the same or higher than the style number of the main unit or subunit where the package is installed and where it performs control.

  Any equipment/software not meeting these requirements might have incompatible areas with your system configuration.

  In this manual, equipment of style S8 is explained.

  For unsupported functions as classified by the style number, see the next page.
- The contents of this manual are subject to change without prior notice as a result of improvements in the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA representative as listed on the back cover of this manual.
- Copying or reproduction of all or any part of the contents of this manual without YOKOGAWA's permission is strictly prohibited.

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Unsupported Functions As Classified by the Style Number

Products with style numbers S1 to S5, and S9 are not sold.

The following functions are available for DC100 with style number S7:

- Report function (/M3, optional)
- SCSI interface (/C5, optional)
- Flag function in computation function (/M1, optional)
- Group reset function in computation function (/M1, optional)

The following functions are available for DC100 with style number S8:

- Ethernet module
- Digital input module
- Measurement of active power and apparent power on ch3 to ch6 for power monitor module

The following function is available for DC100 with style number S10:

- Retransmission module

Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument. In case the wrong instrument or accessories have been delivered, or if some accessories are not present, or if they seem abnormal, contact the dealer from which you purchased them. Furthermore, please contact a Yokogawa representative to order any of parts as follows.

Main Unit DC100

Check that the model and suffix code given on the name plate are according to your order.

Model and Suffix Codes

Model	Suffix Code	Description
DC100	.....	Main unit DC100
Type	-1	Stand-alone model
	-2	Expandable model
Software	2	DAQ 32
Memory	-1	Internal memory 1 MB (standard specification)
	-2	Internal memory 2 MB
	-3	Internal memory 4 MB
FDD	1	3.5-inch floppy disk drive
Power Supply	-1	100-240 VAC
	-2	12-28 VDC (with AC adapter (100-240 VAC when power cord is D, F, R or S)/without AC adapter (when power cord is W or Y))
Power Cord	D	For AC power supply model (when power supply code is -1): 3-pin inlet w/UL, CSA cable (Part No. A1006WD), or DC power supply model (when power supply code is -2): 2-pin inlet w/UL, CSA cable (Part No. B9988YA)
	F	For AC power supply model (when power supply code is -1): 3-pin inlet w/ VDE cable (Part No. A1009WD), or DC power supply model (when power supply code is -2): 2-pin inlet w/VDE cable (Part No. B9988YB)
	R	For AC power supply model (when power supply code is -1): 3-pin inlet w/ SAA cable (Part No. A1024WD), or DC power supply model (when power supply code is -2): 2-pin inlet w/SAA cable (Part No. B9988YC)
	S	For AC power supply model (when power supply code is -1): 3-pin inlet w/BS cable (Part No. A1023WD), or DC power supply model (when power supply code is -2): 2-pin inlet w/BS cable (Part No. B9988YD)
	W	3-pin inlet with screw conversion terminal (/without AC adapter when power supply code is -1)
	Y	2-pin inlet with round-type connector, (/without AC adapter when power supply code is -2)
Options	/C5 ..	SCSI Func.
	/M1 .	Mathematical Func.
	/M3 .	Report Func.
	/D2 ..	deg F Display
	/L1 ..	Summer/Winter Time

NO. (Instrument Number), Style number (equipment) and Release number (software package)

Please refer to these numbers when contacting the dealer.

Subunit DS400/DS600

Check that the model and suffix code given on the name plate are according to your order.

Model and Suffix Codes

Model	Suffix Code	Description
DS400	.....	4-module connection subunit
DS600	.....	6-module connection subunit
Type	00	always 00
Power Supply	-1	100-240 VAC
	-2	12-28 VDC
Power Cord	D	3-pin inlet w/UL, CSA cable (Part No. A1006WD)
	F	3-pin inlet w/VDE cable (Part No. A1009WD)
	R	3-pin inlet w/SAA cable (Part No. A1024WD)
	S	3-pin inlet w/BS cable (Part No. A1023WD)
	W	3-pin inlet with screw conversion terminal (only when power supply is -1)
	Y	2-pin inlet with round-type connector (only when power supply is -2)

NO. (Instrument Number) and Style number (equipment)

Please quote these numbers when contacting the dealer.

Input Modules

Check that the model code given on the name plate is according to your order.

Model Codes

Model	Description
DU100-11	10-channel universal input module, screw type terminal
DU100-21	20-channel universal input module, screw type terminal
DU100-31	30-channel universal input module, screw type terminal
DU100-12	10-channel universal input module, clamp type terminal
DU100-22	20-channel universal input module, clamp type terminal
DU100-32	30-channel universal input module, clamp type terminal
DU200-11	10-channel DCV/TC/DI input module, screw type terminal
DU200-21	20-channel DCV/TC/DI input module, screw type terminal
DU200-31	30-channel DCV/TC/DI input module, screw type terminal
DU200-12	10-channel DCV/TC/DI input module, clamp type terminal
DU200-22	20-channel DCV/TC/DI input module, clamp type terminal
DU200-32	30-channel DCV/TC/DI input module, clamp type terminal
DU300-11	10-channel, mA-input module with screw terminals
DU300-12	10-channel, mA-input module with clamp terminals
DU400-12	Power monitor module for single-phase use
DU400-22	Power monitor module for three-phase use
DU500-12	10-channel, strain input module with 120-Ω bridge resistors
DU500-22	10-channel, strain input module with 350-Ω bridge resistors
DU500-32	10-channel, strain input module with NDIS terminals
DU600-11	10-channel, pulse input module with screw terminals
DU700-11	10-channel, digital input module with screw terminal

NO. (Instrument Number)

Please quote this instrument number when contacting the dealer.

I/O Terminal Modules

Check that model code given on the name plate is according to your order.

Model Codes

Model	Description
DT100-11	DI/DO module, screw type terminal
DT200-11	Alarm module (4 transfer contacts), screw type terminal
DT200-21	Alarm module (10 make contacts), screw type terminal
DT300-11	GP-IB module
DT300-21	RS-232-C module, D-sub terminal
DT300-31	RS-422-A/RS-485 module, screw type terminal
DT300-41	Ethernet module, 10 BASE-T
DT500-11	1-5 V retransmission module, screw type terminal
DT500-21	4-20 mA retransmission module, screw type terminal

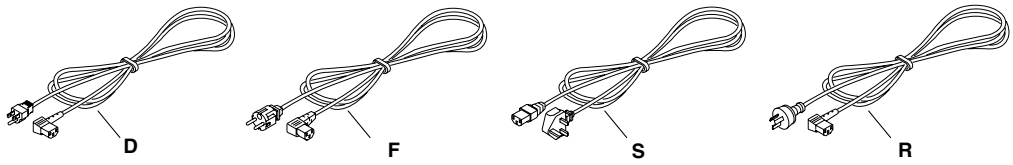
NO. (Instrument Number) and Style number (equipment)

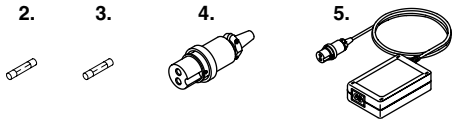
Please quote these numbers when contacting the dealer.

Standard Accessories

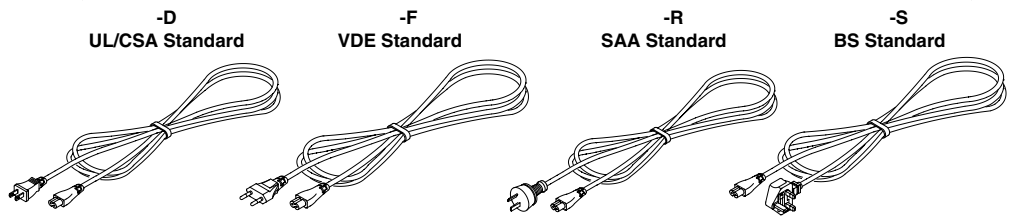
Name	Part No.	Q'ty	Description
1. Power cord	see page 3	1	
2. Fuse for AC power supply	A1350EF	1	Timelag 2.5 A 250 V, located in fuse holder (when power supply code is -1 and power cord code is D, F, R, or S.)
3. Fuse for DC power supply	A1354EF	1	Timelag 6.3 A 250 V, located in fuse holder (when power supply code is -2 and power cord code is D, F, R, or S.)
4. DC power supply terminal connector	A1105JC	1	When power supply is -2, power cord code is D, F, R, or S.
5. AC adapter	B9230ZW	1	When power supply is -2, power cord code is D, F, R, or S.
6. Power cord for AC adapter	see followings	1	
7. DAQ 32	DP120-13	1	
8. Clamp filter	A1179MN	1	When power supply is -2, power code is D, F, R, or S.
9. User's Manual	IMDC100-01E	1	This manual
10. User's Manual	IMDC100-11E	1	Communication Interface manual
11. User's Manual	IMDP12013-61E	1	DAQ 32 manual

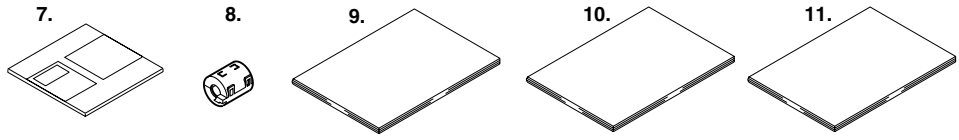
1.One of these power cord types is supplied according to the instrument's suffix code





6.One of these power cord types is supplied according to the suffix code





Optional Accessories

Name	Model	Description
Extension module	DV100-011	
Extension base	DV100-012	
Extension cable	DV200-000	Length: 0.5 m
Extension cable	DV200-001	Length: 1 m
Extension cable	DV200-002	Length: 2 m
Extension cable	DV200-005	Length: 5 m
Extension cable	DV200-010	Length: 10 m
Extension cable	DV200-020	Length: 20 m
Extension cable	DV200-050	Length: 50 m
Extension cable	DV200-100	Length: 100 m
Extension cable	DV200-200	Length: 200 m
Extension cable	DV200-300	Length: 300 m
Extension cable	DV200-400	Length: 400 m
Extension cable	DV200-500	Length: 500 m
Shunt resistance	DV300-011	10 Ω, for screw
Shunt resistance	DV300-012	10 Ω, for clamp
Shunt resistance	DV300-101	100 Ω, for screw
Shunt resistance	DV300-102	100 Ω, for clamp
Shunt resistance	DV300-251	250 Ω, for screw
Shunt resistance	DV300-252	250 Ω, for clamp
Rack mount kit	DV400-011	for DS400/600
Rack mount kit	DV400-015	for DC100/DR130
Strain conversion cable	DV450-001	
Cable adapter	DV250-001	for cable extending
AC adapter	DV500-001	2-pin inlet w/UL, CSA cable
AC adapter	DV500-002	2-pin inlet w/VDE cable
AC adapter	DV500-003	2-pin inlet w/SAA cable
AC adapter	DV500-004	2-pin inlet w/BS cable

Optional Software

Name	Model	Description
DAQ 32	DP120-13	Same as the standard accessory
DAQ Plus	DP320-13	

Safety Precautions

This instrument is an IEC safety class I instrument (provided with terminal for protective grounding).
The following general safety precautions must be observed during all phases of operation, service and repair of this instrument. If this instrument is used in a manner not sepecified in this manual, the protection provided by this instrument may be impaired. Also, YOKOGAWA Electric Corporation assumes no liability for the customer's failure to comply with these requirements.

The following symbols are used on this instrument.

To avoid injury, death of personnel or damage to the instrument, the operator must refer to an explanation in the User's Manual or Service Manual.

Protective grounding terminal.

Function grounding terminal. This terminal should not be used as a "Protective grounding terminal".

Alternating current.

ON(power).

OFF(power).

Make sure to comply with the following safety precautions. Not complying might result in injury, death of personnel or damage to the instrument.

WARNING

Power Supply
Ensure the source voltage matches the voltage of the power supply before turning ON the power.
Power Cord and Plug
To prevent an electric shock or fire, be sure to use the power cord supplied by YOKOGAWA. The main power plug must be plugged in an outlet with protective grounding terminal. Do not invalidate protection by using an extension cord without protective grounding.
Protective Grounding
Make sure to connect the protective grounding to prevent an electric shock before turning ON the power.
Necessity of Protective Grounding
Never cut off the internal or external protective grounding wire or disconnect the wiring of protective grounding terminal. Doing so poses a potential shock hazard.
Defect of Protective Grounding and Fuse
Do not operate the instrument when protective grounding or fuse might be defective.
Do not Operate in an Explosive Atmosphere
Do not operate the instrument in the presence of flammable liquids or vapors. Operation of any electrical instrument in such an environment constitutes a safety hazard.
Fuse
To prevent a fire, make sure to use fuses with specified standard(current, voltage, type). Before replacing the fuse, turn OFF the power and disconnect the power source. Do not use a different fuse or short-circuit the fuse holder.
Do not Remove any Covers
There are some areas with high voltages. Do not remove any cover if the power supply is connected. The cover should be removed by qualified personnel only.
External Connection
To ground securely, connect the protective grounding before connecting to measurement or control unit.

How to Use this Manual

This User's Manual consists of the following fourteen chapters and Index.

Chapter	Title	Description
Chapter 1	**System Configuration**	Explains the position of the DC within DARWIN, its configuration, etc..
Chapter 2	**Functions**	Explains the functions of the DC. Operating procedures are not explained here.
Chapter 3	**Installation and Wiring**	Describes cautions for use, explains how to install and wire the DC, the power cord, how to switch ON/OFF the DC, how to structure system modules, how to set the date/time, explains the noise filter, etc..
Chapter 4	**Setting the Monitor Mode Display**	Explains the display in the monitor mode.
Chapter 5	**Setting the Input Type/ Span/Linear Scaling**	Explains the operations when setting the input type, span and linear scaling function.
Chapter 6	**Writing Measured or Computed Data**	Explains the operations when writing measured or computed data on the built-in RAM disk and the setting procedure for the writing action.
Chapter 7	**Working With Measured or Computed Data File**	Explains the procedure for copying measured or computed data onto a floppy disk, display of directory or file information, file deletion in the RAM disk, and RAM disk initialization.
Chapter 8	**Executing Alarm Setting or Display and Other Settings**	Explains how to set an alarm and how to do when an alarm occurs.
Chapter 9	**Event/Action Function and Other Functions**	Explains how to operate the event/action function, how to copy channel information, how to reset alarms, how to reset the timer, how to use the key-lock, and how to use the external input/output function.
Chapter 10	**Basic Settings (SET UP)**	Explains functions which usually do not need to be changed, and how to set basic functions.
Chapter 11	**Working With a File in SET Mode or SETUP Mode**	Explains the operations for saving or reading data settings, file deletion, and floppy disk formatting.
Chapter 12	**Executing Computation (Available with the /M1 Model)**	Explains the computation function (optional).
Chapter 13	**Trouble-Shooting and Maintenance**	Explains maintenance procedures, error messages and calibration procedures.
Chapter 14	**Specifications**	Explains specifications for all features of DC.
Index		Gives the index in main menu and alphabetic order.

Conventions Used in this Manual

Used Symbols

The following symbol marks are used to attract the operator's attention.

Affixed to the DC100, indicating that for safety, the operator should refer to the appropriate User's Manual. For a list of the User's Manuals, refer to page 1.

WARNING

Describes precautions that should be observed to prevent the danger of injury or death to the user.

CAUTION

Describes precautions that should be observed to prevent damage to the DC100.

Note

Provides information that is important for proper operation of the DC100.

Indicates the relevant panel keys and indicators to carry ou the operation

The procedure is explained by a flow diagram. For th meaning of each operation, refer to the example below. Th operating procedures are given with the assumption that yo are not familiar with the operation. Thus, it may not b necessary to carry out all the steps when changing settings

Describes settings and restrictions relating to the operation

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List of Menus and Set-up Data

The following is a list of set-up data, procedures to switch to different setting modes, and setting menu.

Measurement Condition Settings

Parameters	Procedure	Selecting menu	Reference
Input type, span, linear scaling	RANGE key	001-01:VOLT/2V	Chapter 5
Units*1	SET key*2	SET=UNIT	Section 8.3
Moving average	Press the SET key for about three seconds*2	SET=MOVE AVE	Section 8.6
Measurement cycle*1	Turn ON power while pressing the DISP key	SET UP=SCAN INTVL	Section 10.1
A/D integration time*1	Turn ON power while pressing the DISP key	SET UP=A/D INTG	Section 10.3
Filter*1	Turn ON power while pressing the DISP key	SET UP=FILTER	Section 10.3

*1: Make sure that the total number of setting changes, including calibrations and restructuring, does not surpass 100000.
*2: Procedure varies according to the menu configuration of the SET key (see section 10.9).

Settings for Saving Measured/Computation Data (Built-in RAM disk)

Parameters	Procedure	Selecting menu	Reference
Start/Resume writing measured data	START key		Section 6.1
Stop writing measured data	STOP key	WRITE STOP=YES	Section 6.1
Suspend writing measured data	STOP key	WRITE STOP=PAUSE	Section 6.1
Write one scan of data	FUNC key*	DATA WRITE	Section 6.1
Select channel for writing	MEM SET key	MEMORY=CH SET	Section 6.2
Set writing operation	MEM SET key	MEMORY=WR MODE	Section 6.2
Copy to floppy disk or SCSI device	FD COPY key	COPY MODE=ALL/SELECT	Section 7.1
Convert to ASCII data and copy	MEM SET key	MEMORY=CONVERT	Section 7.2
Display file information	MEM SET key	MEMORY=FL INFO	Section 7.3
Display directory	MEM SET key	MEMORY=DIR	Section 7.4
Delete file	MEM SET key	MEMORY=DELETE	Section 7.5
Initialize built-in RAM disk	MEM SET key	MEMORY=INIT	Section 7.6
Set file operation options	Turn ON power while pressing the DISP key	SETUP=MRM SET	Section 10.6

*: Procedure varies according to the menu configuration of the FUNC key (see section 10.8).

Settings for Saving/Loading Measured data and Floppy Disk/SCSI Device

Parameters	Procedure	Selecting menu	Reference
Save setup data of SET mode	SET key*	SET=MEDIA	Section 11.1
Load set-up data of SET mode	SET key*	SET=MEDIA	Section 11.2
Display directory	SET key*	SET=MEDIA	Section 11.3
Delete file	SET key*	SET=MEDIA	Section 11.4
Display floppy disk/SCSI device information	SET key*	SET=MEDIA	Section 11.5
Initialize floppy disk/SCSI device	SET key*	SET=MEDIA	Section 11.6
Save set-up data of SET UP mode	Turn ON power while pressing the DISP key	SETUP=MEDIA	Section 11.1
Load set-up data of SET UP mode	Turn ON power while pressing the DISP key	SETUP=MEDIA	Section 11.2

*: Procedure varies according to the menu configuration of the SET key (see section 10.9).

Display Settings

Parameters	Procedure	Selecting menu	Reference
Switch display	DISP key and MODE key	--------	Chapter 4
Display update interval	Turn ON power while pressing the DISP key	SET UP=DISPLAY	Section 10.10

Alarm Settings

Parameters	Procedure	Selecting menu	Reference
Alarm, alarm output relay	ALARM key	001-01:1/OFF	Section 8.1
Alarm interval/hysteresis/hold	Turn ON power while pressing the DISP key	SET UP=ALARM	Section 10.3
Execute alarm acknowledge	FUNC key*	ALARM ACK	Section 9.3
Reset alarm	FUNC key*	ALARM RST	Section 9.3

*: Procedure varies according to the menu configuration of the FUNC key (see section 10.8).

Computation Settings

Parameters	Procedure	Selecting menu	Reference
Computation equation	SET key*	SET=MATH	Section 12.2
Constant	SET key*	SET=CONST	Section 12.3
Perform computation	FUNC key**	MATH START	Section 12.5
Clear measured data and perform computation	FUNC key**	MATH CLR START	Section 12.5
Stop computation	FUNC key**	MATH STOP	Section 12.5
Clear incomplete measurement status	FUNC key**	MATH ACK	Section 12.5
Handling of computation error/time axis setting of TLOG SUM	Turn ON power while pressing the DISP key	SET UP=MATH	Section 12.6
Group	Press the SET key for about three seconds*	SET=GROUP	Section 12.4

*: Procedure varies according to the menu configuration of the SET key (see section 10.9).
**: Procedure varies according to the menu configuration of the FUNC key (see section 10.8).

Other Settings

Parameters	Procedure	Selecting menu	Reference
Timer	SET key*	SET=TIMER	Section 8.4
Event/Action	SET key*	SET=LOGIC	Section 9.1
Copy between channels	SET key*	SET=CH COPY	Section 9.2
Tag	Press the SET key for about three seconds*	SET=TAG	Section 8.5
Message	Press the SET key for about three seconds*	SET=MESSAGE	Section 8.5
Match time	Press the SET key for about three seconds*	SET=MATCH TIME	Section 8.6
Relay, internal switch operation mode	Turn ON power while pressing the DISP key	SET UP=RELAY	Section 10.4
Burnout	Turn ON power while pressing the DISP key	SET UP=BURN OUT	Section 10.5
Reference junction compensation	Turn ON power while pressing the DISP key	SET UP=RJC	Section 10.5
File alarm time	Turn ON power while pressing the DISP key	SET UP=MEM SET	Section 10.6
Key lock	Turn ON power while pressing the DISP key	SET UP=LOCK	Section 10.7
Menu configuration of FUNC key	Turn ON power while pressing the DISP key	SET UP=FUNC PARM	Section 10.8
Menu configuration of SET key	Turn ON power while pressing the DISP key	SET UP=SET PARM	Section 10.9
Report function	Turn ON power while pressing the DISP key	SET UP=REPORT	Section 10.12
Retransmission filter	Turn ON power while pressing the DISP key	SET UP=OUTPUT	Section 10.14
Reset timer	FUNC key**	TIMER RESET	Section 9.3
Lock keys	FUNC key**	KEY LOCK ON	Section 9.3
Start report	FUNC key**	REPORT START	Section 10.12
Stop report	FUNC key**	REPORT STOP	Section 10.12
Display module settings	Press the FUNC key for about three seconds**	MODULE INF	Section 9.4
Display communication settings	Press the FUNC key for about three seconds**	COMM INF	Section 9.4
System configuration	Press the FUNC key for about three seconds**	RE SYSTEM	Section 3.9
Initialize setting information	Press the FUNC key for about three seconds**	RAM INIT	Section 9.4

*: Procedure varies according to the menu configuration of the SET key (see section 10.9).
**: Procedure varies according to the menu configuration of the FUNC key (see section 10.8).

1.1 About DARWIN

Created from a completely new concept that is based on modular architecture, this group of next generation data acquisition systems is called **DARWIN (Data Acquisition and Recording Windows)**.

Today many data acquisition networks are increasingly being linked together. More than ever before, large volume, high speed, accurate, easy-to-use communication functions are essential in many disciplines.

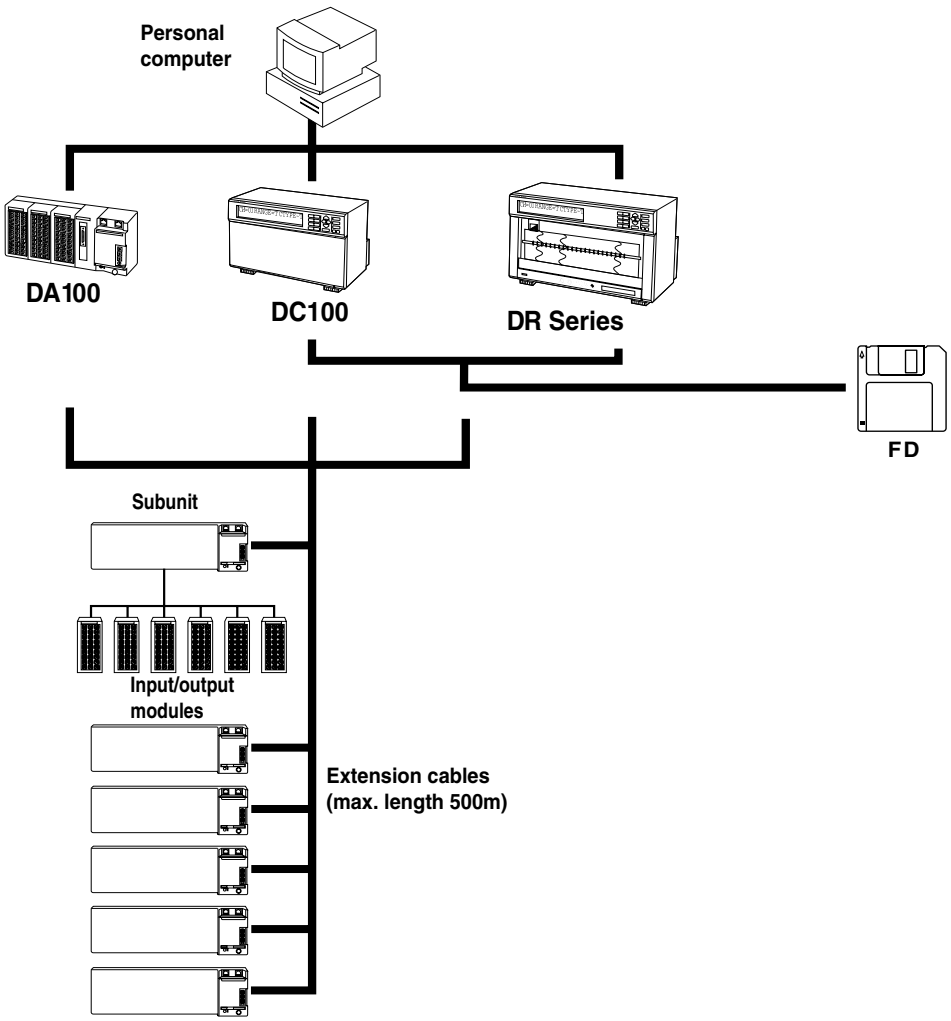
In the world of measurement and control where the number of measurement points has increased sharply, the ability to acquire information from a large number of points easily and economically is crucial. Interfacing to a personal computer allows simplified utilization of the information while improving quality and efficiency.

DARWIN is based on a unique, new concept to meet these needs. The art of measurement is revolutionized by **DARWIN** which integrates functions of conventional recording and data logging.

Most existing data acquisition equipment has been the all-in-one type in which the measurement section and display/recording section are contained in one box. While this simplifies operation on the one hand, it is difficult to adapt to changes in the measurement environment and also makes expansion difficult.

DARWIN uses a data acquisition engine and remote I/O modules which are completely separate from each other. It is an entirely new product line which quickly and flexibly copes with various restrictive conditions and changes in specifications.

There are three instrument series: the DA data acquisition instrument series which logs data on a personal computer base; the DR series which acquires and records data by connecting various modules to a chart recorder; and the DC series which acquires data based on the saving to electronic media.



1.2 Product Overview

This product is a data collector which can measure and save from small-scale 10-ch data up to widely distributed 300-ch multi-point data.
There are two standard models of DC100: the DC100 stand-alone model, and the DC100 expandable model.

DC100 Stand-alone model

Being suitable for small scale data logging between 10 and 40 ch, the light-weight main unit allows an easy and quick setting up.

DC100 Expandable model

The expandable model consists of one main unit and by connecting up to six subunits (DS400/DS600), the number of measurement points can be expanded to a maximum of 300 ch.
Using dedicated extension cables between units, interconnections can be extended up to 500 m. Since measured objects scattered over a wide area can be wired fast and with a minimum of wiring, a flexible, extensive measurement system can be configured. The input modules to be incorporated in the DC100 or DS400/600 can be selected from the following, to suit your measurement conditions:

• Universal input module and DCV/TC/DI input module

Temperature, DC voltage and contact signals can be measured, but cannot be connected to the expandable model's main unit.

• mA-input Module

This module can directly measure DC currents ranging from -20 mA to 20 mA since it contains shunt resistors. It cannot be connected to the expandable model's main unit.

• Power Monitor Module

This module can measure the effective voltage, effective current, active power, reactive power, apparent power, frequency, power factor and phase angle for an AC voltage or AC current input. It is available in either a single-phase or three-phase model. This module cannot be connected to the expandable model's main unit.

• Strain Input Module

This module can measure strain. It is available in either a model with built-in 120- or 350-Ω bridge resistors or a model with NDIS terminals where bridge resistors are connected externally. The module cannot be connected to the expandable model's main unit.

• Pulse Input Module

This module can measure pulses. It cannot be connected to the expandable model's main unit.

• Communication interface module

This module is necessary when communicating with a personal computer. Measurement conditions can be set and data acquired via the communication interface (GP-IB, RS-232-C, etc.) of this module. This module can only be connected to the main unit.

• Alarm module

This module can output alarm signals as contact signals. The module can be connected to the main unit or the subunit.

• DI/DO module

This module allows a signal to be output in the case of alarm, failure, or file alarm and a remote control signal for the product to be input. The module can be connected to the main unit or the subunit but only one module in all units.

• Extension module

If input modules are to be installed where a nearby power supply is not available, power can be supplied from a stand-alone model's main unit or expandable model's subunit directly to the input module.

• Retransmission module

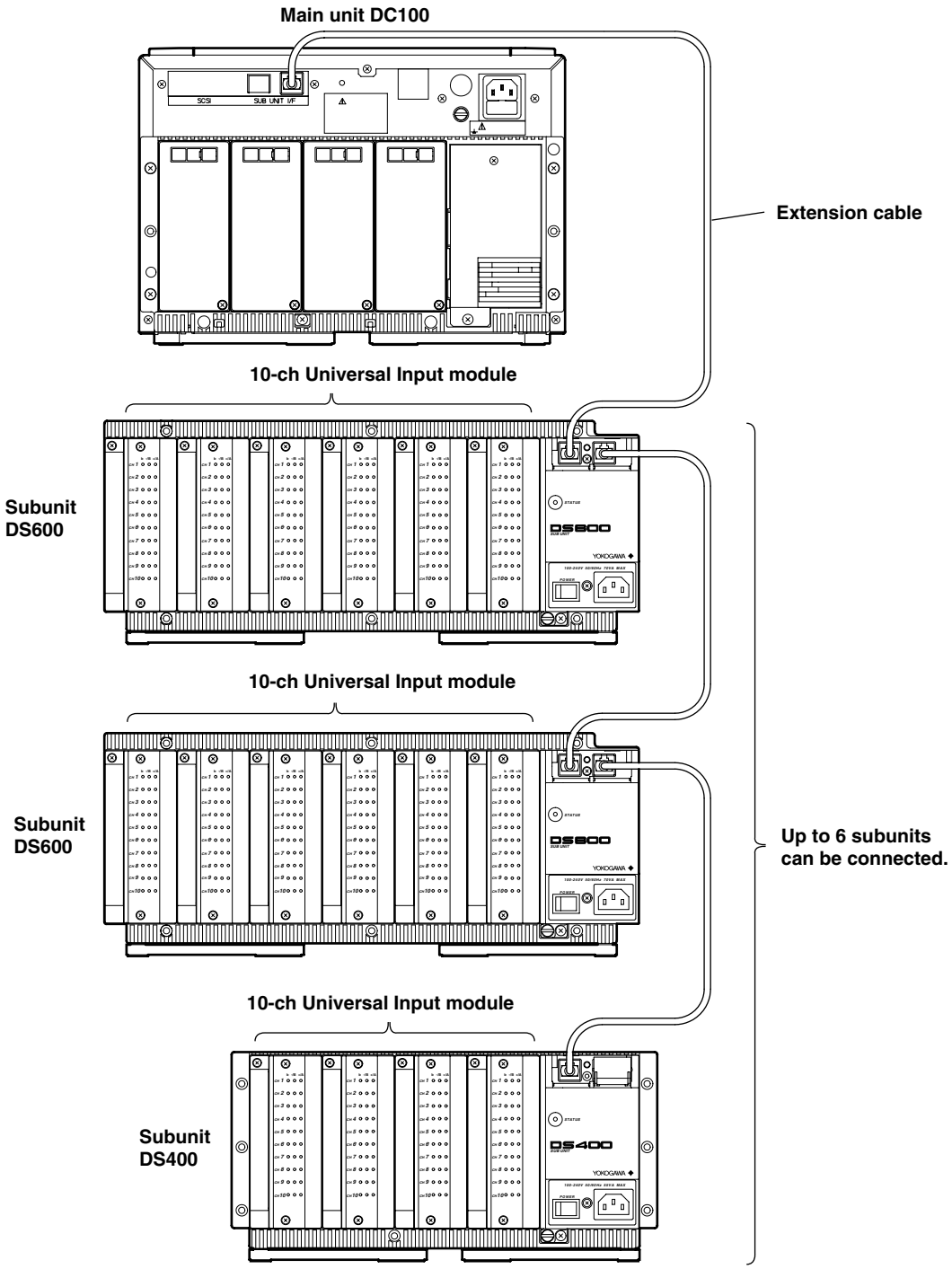
This module deals with data that are measured or computed by the product, or set by a personal computer via a communication interface. The modules convert them to 1-5 V analog voltage or 4-20 mA analog current signals for output. The module cannot be connected to the expanable model's main unit.

Note

When the following handling is done, it is necessary to carry out "system construction" to operate the instrument correctly. After executing system construction, confirm the module information. For details, see page 9-16.

. Connection (including addition or replacement)/removal of subunits, or unit number setting (see page 3-6)
. Mounting (including addition or replacement)/removal of modules

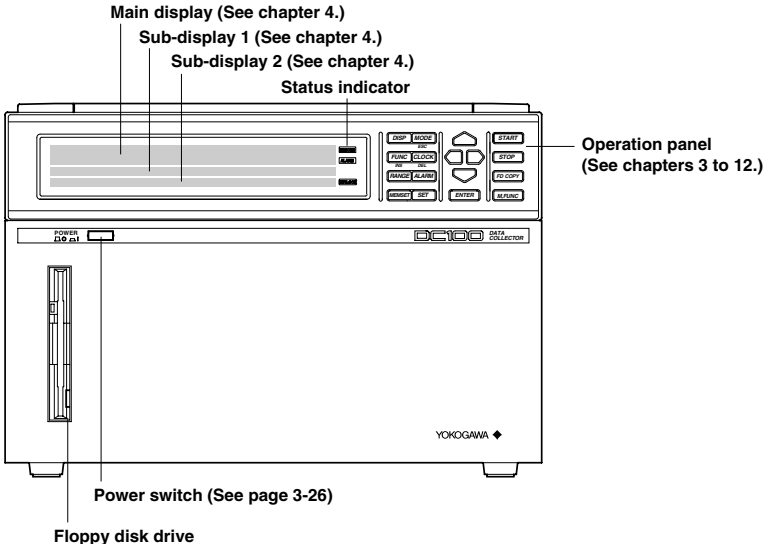
Example of Connection (for the expandable model)



1.3 Names of Parts

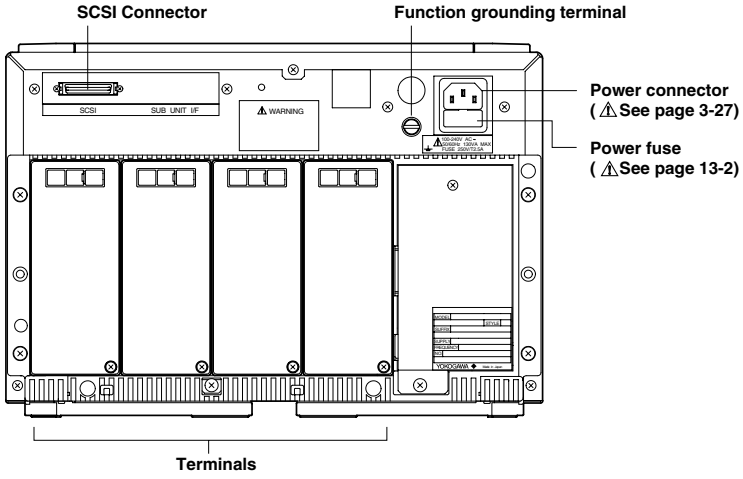
DC100 Stand-alone Model (DC100-1)

Front

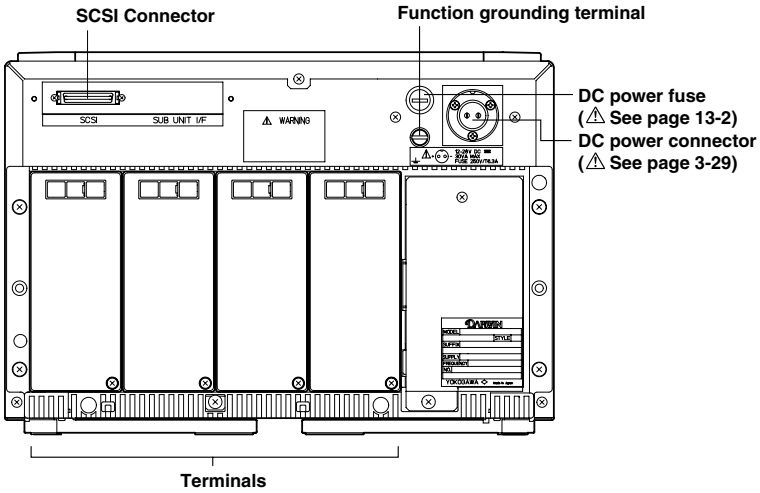


Rear

AC power supply model

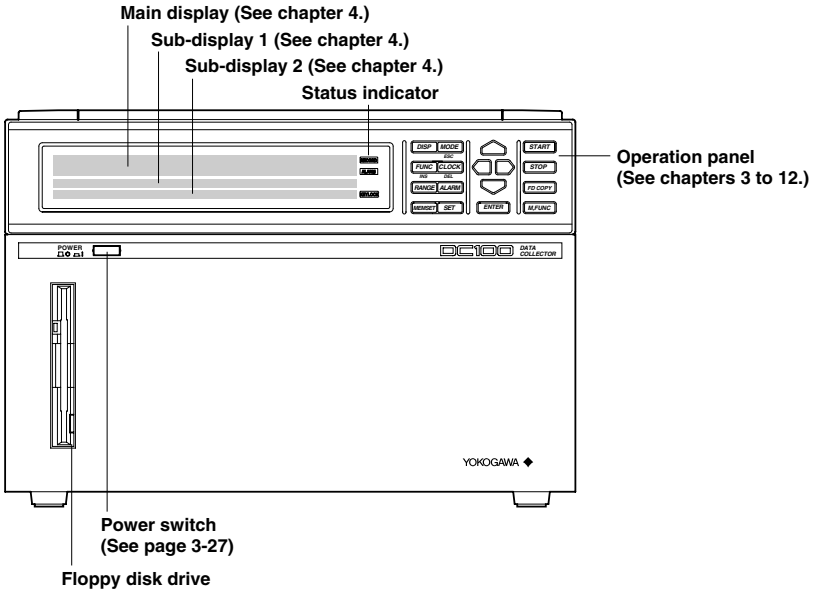


DC power supply model



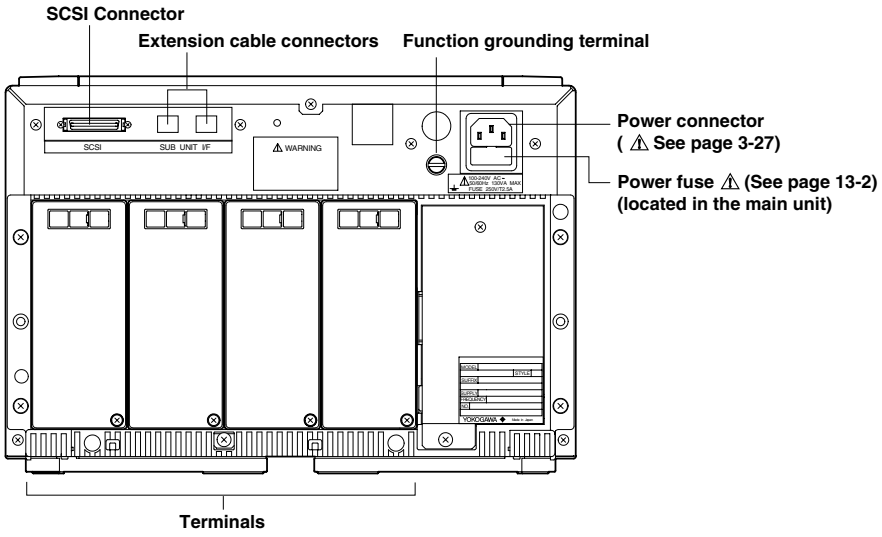
DC100 Expandable Model (DC100-2)

Front

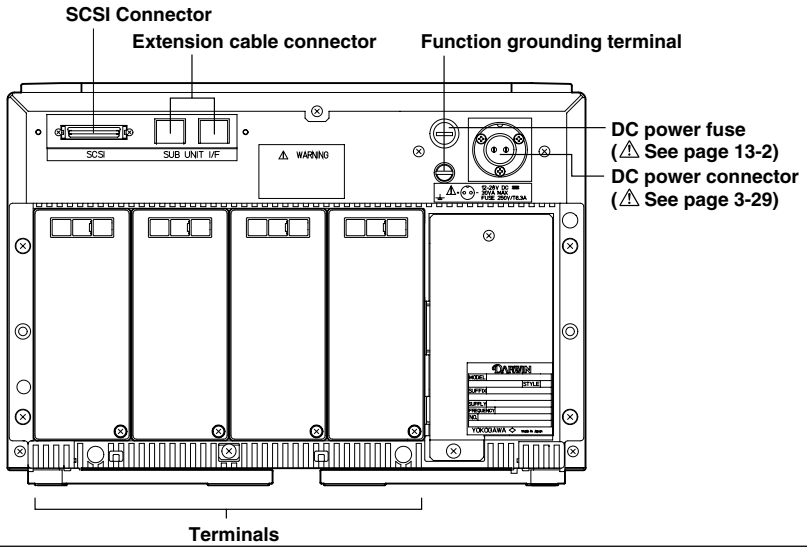


Rear

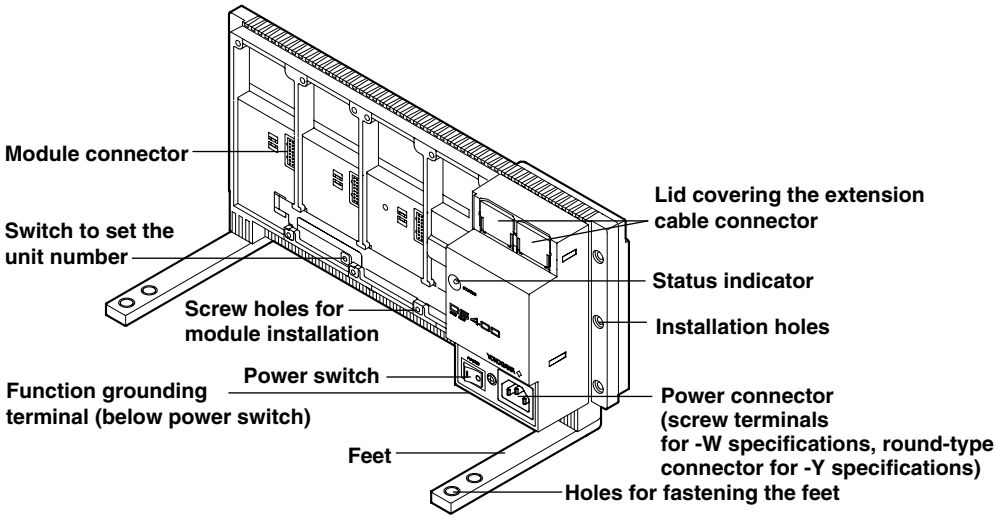
AC power supply model



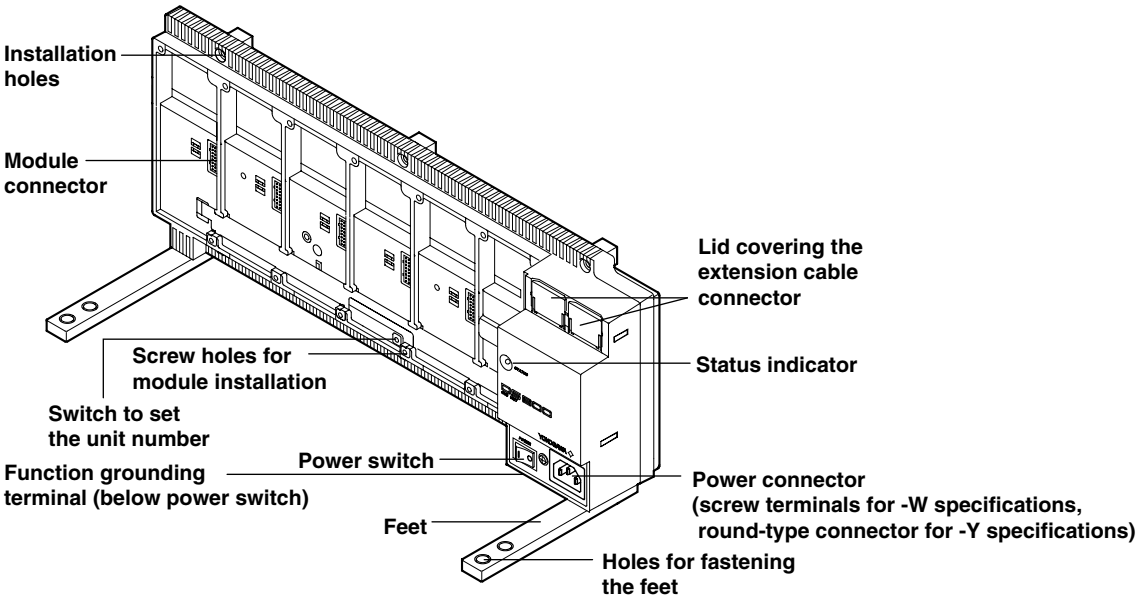
DC power supply model



Subunit DS400

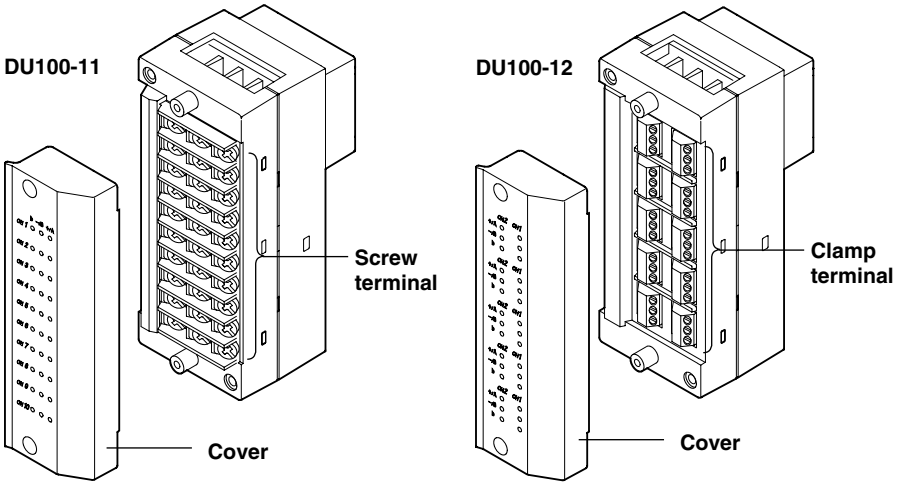


Subunit DS600



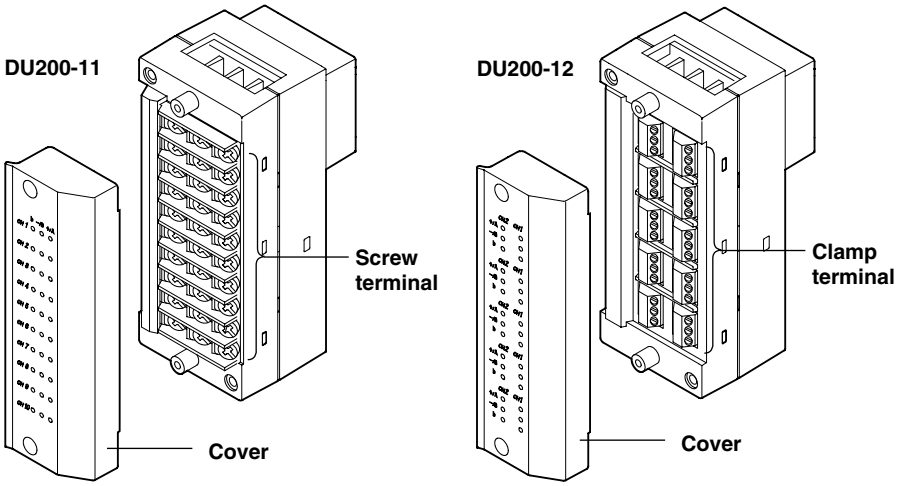
Input Modules

10-ch Universal input module (DU100-11/DU100-12)



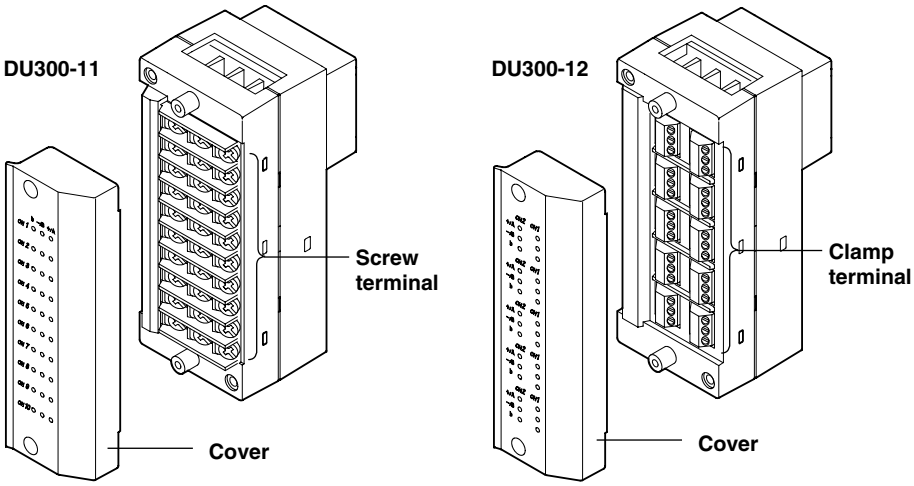
The 20-ch Universal input modules (DU100-21/DU100-22) and the 30-ch Universal input modules (DU100-31/DU100-32) are similar to the ones shown above.

10-ch DCV/TC/DI input module (DU200-11/DU200-12)

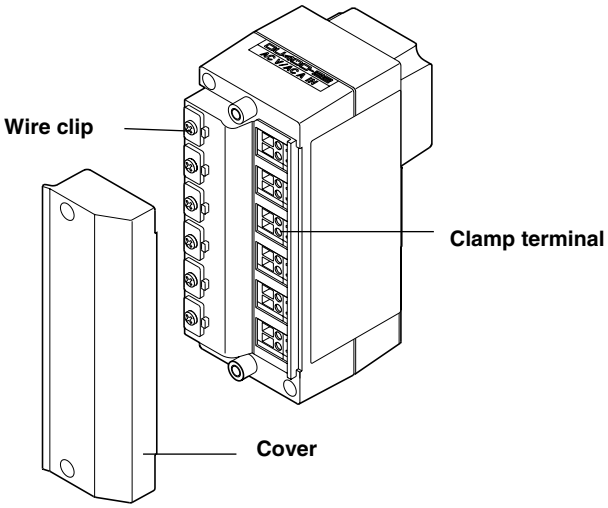


The 20-ch DCV/TC/DI input modules (DU200-21/DU200-22) and the 30-ch DCV/TC/DI input modules (DU200-31/DU200-32) are similar to the ones shown above.

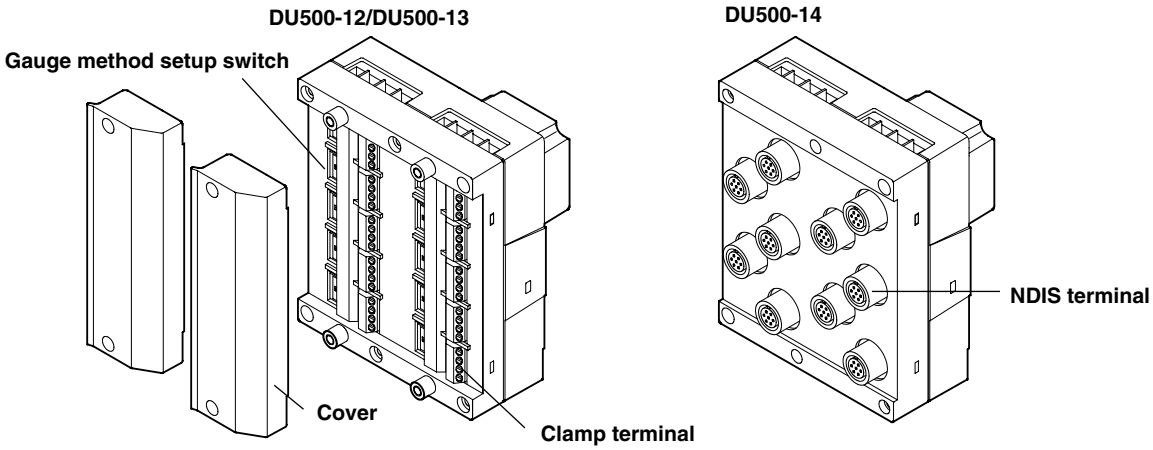
mA-input module (DU300-11/DU300-12)



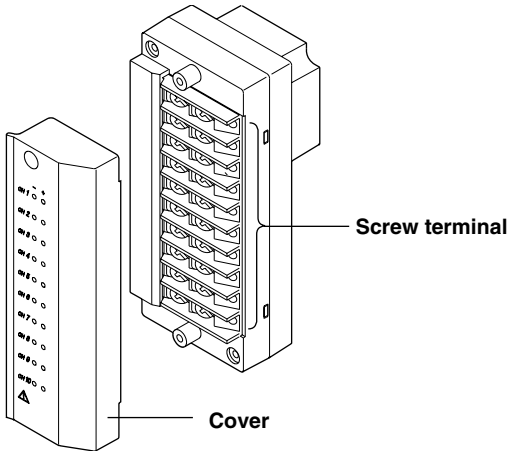
Power monitor module (DU400-12/DU400-22)



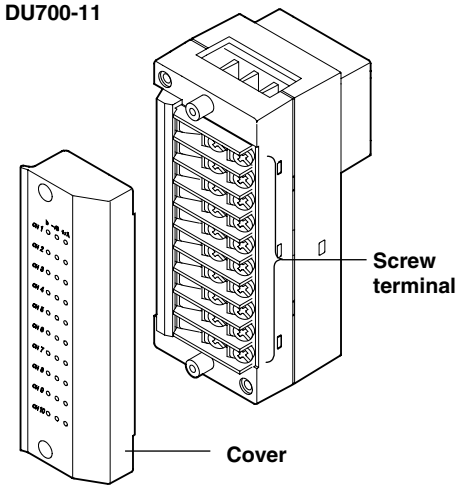
Strain input module (DU500-12/DU500-13/DU500-14)



Pulse input module (DU600-11)

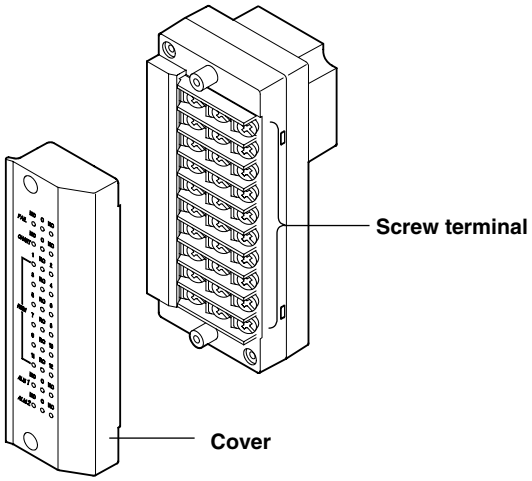


Digital input module (DU700-11)



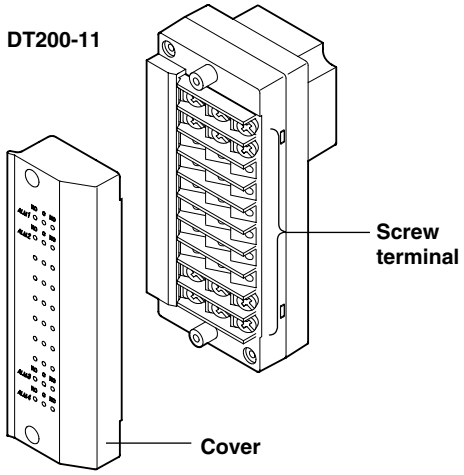
I/O Terminal Modules

DI/DO module (DT100-11)

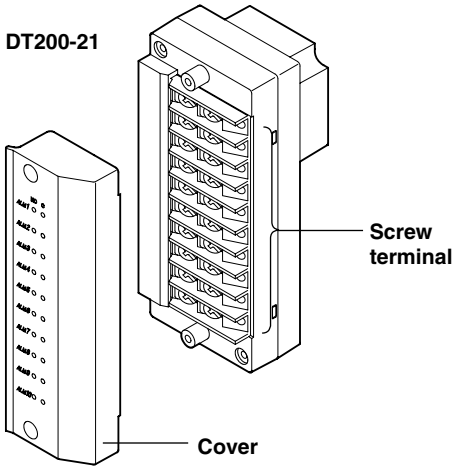


Alarm module (DT200-11/DT200-21)

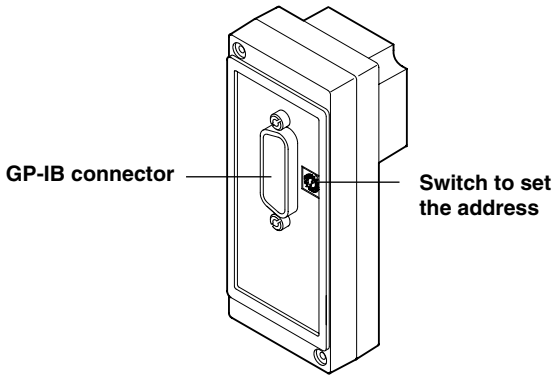
DT200-11



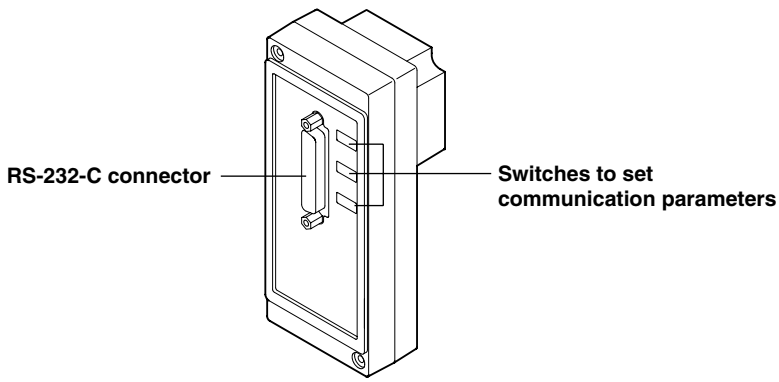
DT200-21



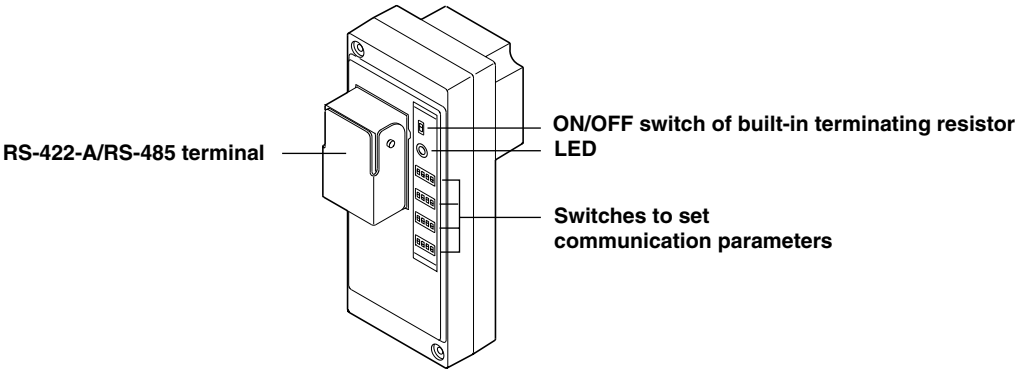
GP-IB module (DT300-11)



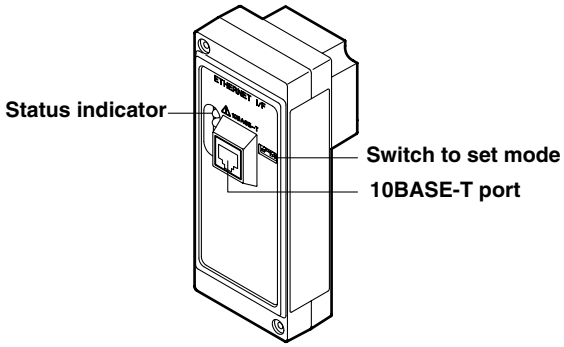
RS-232-C module (DT300-21)



RS-422-A/RS-485 Module (DT300-31)

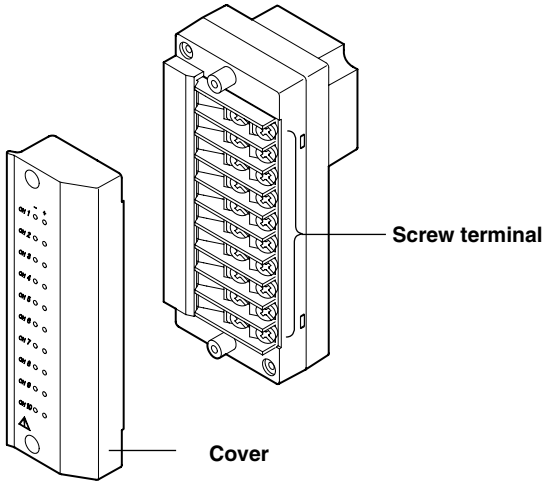


Ethernet Module (DT300-41)

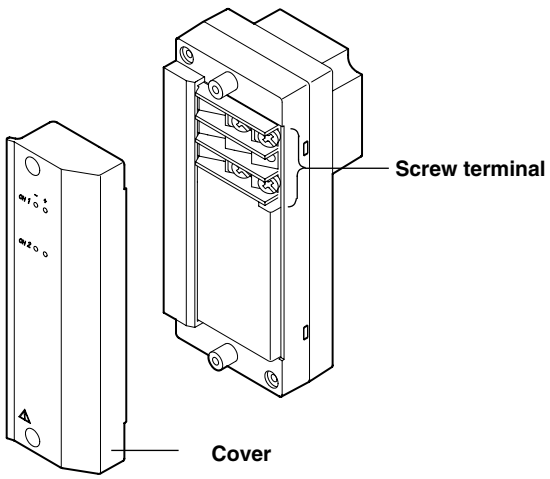


Retransmission Module

1-5 V Retransmission Module (DT500-11)

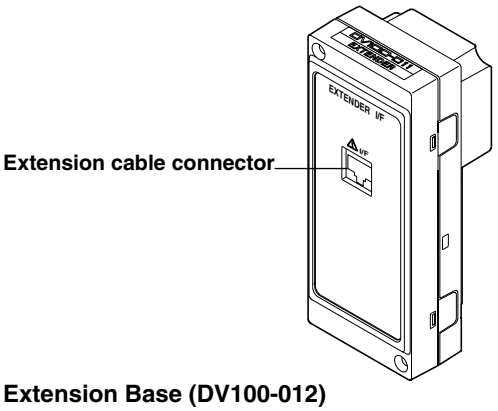


4-20 mA Retransmission Module (DT500-21)

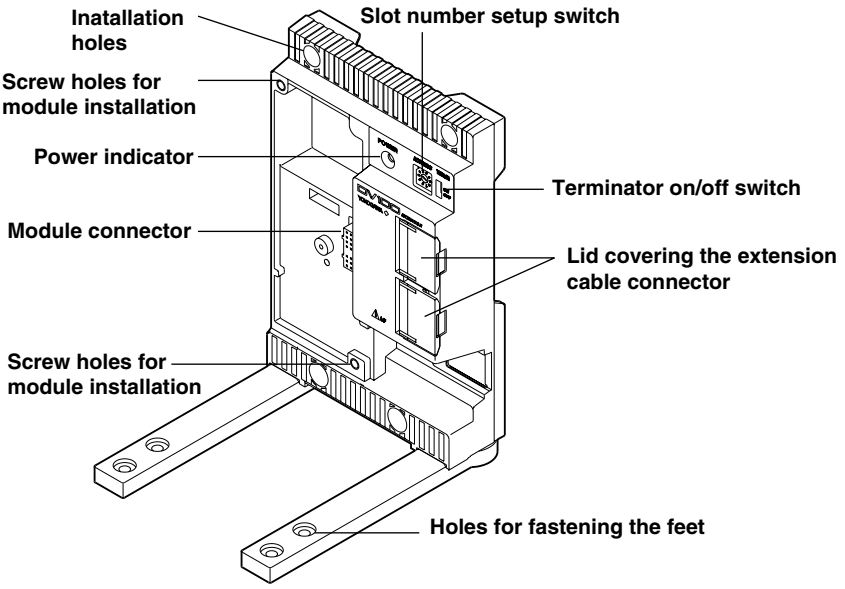


Extension Module/Extension Base

Extension Module (DV100-011)



Extension Base (DV100-012)



1.4 Floppy Disk

A floppy disk drive is provided with the instrument.

Applicable Floppy Disks

3. 5-inch floppy disks can be used for this instrument. They can also be formatted on this instrument.

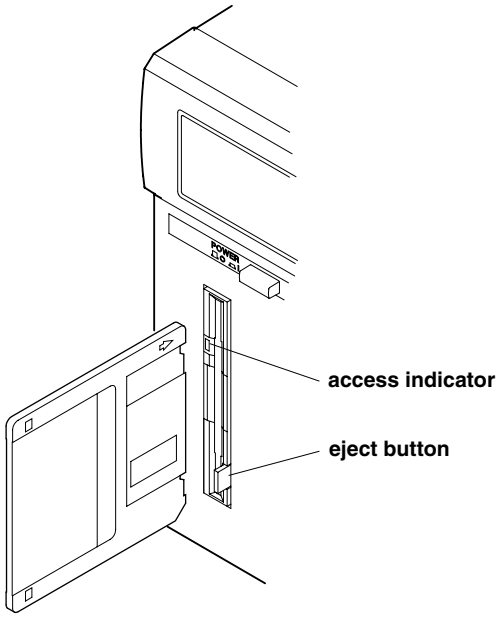
- 2HD type: 1.2 MB or 1.44 MB (MS-DOS format)
- 2DD type: 720 MB (MS-DOS format)

Inserting a Floppy Disk into the Drive

Insert the floppy disk into the floppy disk drive, shutter side first and with the label face in the right side. Make sure that the floppy disk is inserted until the eject button pops up.

Removing the Floppy Disk from the Drive

Make sure that the access indicator is not lit, then push the eject button to remove the floppy disk.



CAUTION

- If the floppy disk is removed when the access indicator is still lit, damage to the magnetic head of the floppy disk drive or to data saved on the floppy disk may result. Before removing the floppy disk, always make sure that the access indicator is OFF.
- Do not leave a floppy disk in the floppy disk drive for a long time. If left in the drive, dust or foreign matter may get into the floppy disk drive leading to damage of the drive.

General Precautions Regarding Handling of Floppy Disk

For general precautions regarding handling of floppy disks, refer to the instruction manual provided with the disk.

2.1 Display Functions

The inter-active front panel display consists of three rows. The first row is the main display, and the second and third row are sub-display 1 and 2 respectively.

Monitor Mode and Status Display

Monitor Mode

- **Auto Mode**
  This mode can be set for the main display, sub-display 1 and sub-display 2. Measurement values of all channels will be consecutively displayed with update interval.
- **Manual Mode**
  This mode can be set for the main display, sub-display 1 and sub-display 2. Measurement values of a single channel will be displayed. The display update interval is the same as the measurement interval (refer to page 2-4).
- **Page Mode**
  This mode can be set for the main display. When choosing this display, the measurement values of 5 consecutive channels will be displayed as a page using also sub-display 1 and 2. The display update interval is the same as the measurement interval (refer to page 2-4).
- **File Utilization Mode**
  This mode can be set in sub 1/sub 2 display. File utilization during writing is displayed on a bar graph. The display update period is one second.
- **Memory Utilization Mode**
  This mode can be set in sub 1/sub 2 display. Built-in RAM disk utilization is displayed on a bar graph. The display update period is one second.
- **Alarm Search Mode**
  This mode can be set for the main display, sub-display 1 and sub-display 2. Channels at which an alarm occurred will be searched for and their measurement values displayed. The display update interval is 2 seconds.
- **Bargraph Mode**
  This mode can be set for sub-display 1. Measurement values which are shown on the main display will be shown as a bargraph. The display update interval is the same as the interval of the main display.
- **Alarm Status Mode**
  This mode can be set for sub-display 1 and 2. The display will show per channel whether or not an alarm occurred (refer to page 2-7). On one display the alarm status of a maximum of 30 channels can be monitored (depending on the number of input channels). The display update interval is 0.5 seconds.
- **Relay Status Mode**
  This mode can be set for sub-display 1 and 2. The display will show the operating status of internal switches/alarm output relays (refer to page 2-7). On one display a maximum of 30 relay statuses can be monitored. The display update interval is 1 second.
- **Clock Mode**
  This mode can only be set for sub-display 2. The current date and time are shown.
- **Displaying the Selected Mode**
  To the right of sub-display 1 the currently selected display mode is shown for a specific display.

Status Display

Indicators at the right side of the display will light up to show that data saving is in progress (refer to page 2-5), alarms are occuring (refer to page 2-7), and keys are locked (refer to page 2-11).

Remote/Local Status Display

The status of remote/local control will be shown on sub-display 2. Keys cannot be operated in remote control.

Display for Setting the Type of Input, Computation and Saving Conditions

Menus for setting each of the following functions will be displayed.

- measurement input functions (refer to page 2-3)
- data-saving functions (refer to page 2-5)
- alarm functions (refer to page 2-7)
- calculation functions (refer to page 2-10)
- event/action function, key-lock function and external in/output function (refer to page 2-11, 12)

Display for Setting Fundamental Functions

Menus for performing fundamental settings will be displayed.

2.2 Measurement Input Functions

Input Type

DC Voltage
Measurements can be done after selecting the measurement range per channel. The minimum range is 20 mV, the maximum range is 50 V.

Thermocouple
Measurements can be done after selecting the type of thermocouple per channel. The available types are R, S, B, K, E, J, T, L, U, N, W and KPvsAu7Fe.
Reference Junction Compensation (RJC) can be set to either use Internal RJC (INT) or External RJC (EXT) per channel.
For each channel, the burnout (thermocouple disconnection) function can be selected as either on or off, or overtravel of the measured result can be selected for either the positive (up) or negative (down) side.

Resistance Temperature Detector
Measurements can be done after selecting the type of resistance temperature detector (RTD) per channel. The available 17 types are Pt100 (1 mA), Pt100 (2 mA), JPt100 (1 mA), JPt100 (2 mA), Pt50 (2 mA), Ni100 (1 mA)SAMA, Ni100 (1 mA) DIN, Ni120 (1 mA), J263*B, Cu10GE, Cu10L&N, Cu10WEED, Cu10BAILEY, Pt100 (1 mA) high resolution, Pt100 (2 mA) high resolution, JPt100 (1 mA) high resolution and JPt100 (2 mA) high resolution.

Contact Input
The type of contact input can be selected from voltage level input or contact input, and data saving can be set ON or OFF per channel. In case of the voltage level input a voltage level up to 2.4 V results in saving OFF, whereas a voltage level of 2.4 V or more results in saving ON.

DC Currents
DC currents ranging from -20 mA to 20 mA can be measured by means of the built-in 100-Ω shunt resistors.

AC Voltages/Currents
The effective voltage, effective current, active power, reactive power, apparent power, frequency, power factor and phase angle can be measured. The measuring range is common to all terminals. The input terminals of the module with this input mode, unlike those of modules with other input modes, are not consistent with a setup screen in terms of the channel number.

Strain
The module for this input mode supports the single-gauge, single-gauge three-wire (not yet supported by the DU500-14 module), adjacent-side two-gauge, opposed-side two-gauge and four-gauge methods. If you have connected any new strain gauge or changed the measuring range, go through initial balancing before starting measurement.

Pulses
The module for this input mode can measure the number of pulses per second on a channel basis or detect the on/off states by means of any variations occurring in the instantaneous value every second. Once you connect the pulse input module, you can sum up values without the need for the computing function.

Skipping Input Channels
This function allows skipping measurement, data saving and display of channels you are not using. Measurement, data saving and display will not be done for the skipped channels.

Reference Junction Compensation (RJC)
This function is to be used when measuring temperatures using thermocouples. The voltage generated by a thermocouple depends on the temperature of the spot of measurement and the reference junction temperature. Reference junction compensation is a function which compensates the temperature at the side of the measurement instrument to 0 degrees C.
To compensate for the environmental temperature an internal circuit can be selected, or compensation by a fixed compensation voltage value (external) can be set.

Scan Interval

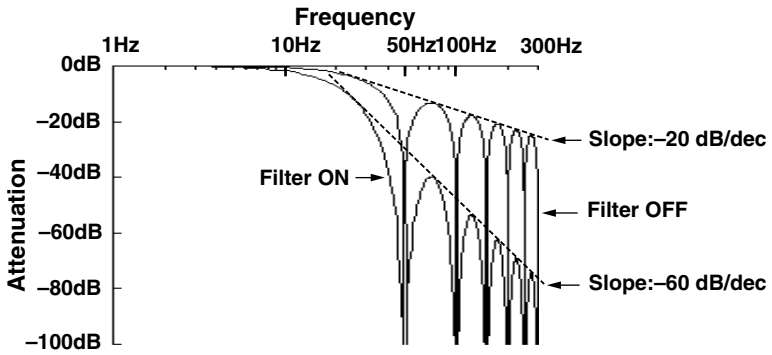
- The duration of time (one scan) in which the measurement of all channels is carried out, is called the scan interval.
- This interval can be set to any value from 0.5 second to 60 seconds. The shortest is 40 ch/500 ms for the stand-alone model, or 300 ch/500 ms for the expandable model (varies with the shortest measurement period of the input module).

A/D Integration Time

This instrument measures the input signal after putting it through an A/D converter. In order to minimize the noise imposed on the input signal, specific integration times exist.
The integration time can be selected from 20 ms (50 Hz), 16.7 ms (60 Hz) and 100 ms (10 Hz). When "AUTO" is selected, the integration time will be automatically decided according to the 50/60 Hz frequency of the power supply.
AUTO does not function if the instrument is a DC power supply model (Selecting "AUTO" will set the A/D integration time to 20 ms (50 Hz)). If you are using the instrument on a 60-Hz power supply, set the A/D integration time to 16.7 ms (60Hz) or 100 ms (10 Hz).

Input Filter

A filter can be set ON/OFF to reduce normal mode noise. Effects on normal mode noise are as follows depending on the filter being ON/OFF (theoretical values).



Span

The maximum value and the minimum value of the measurement range are decided when setting the type of input. The difference between the minimum value and maximum value which will be set as a different scale within this measurement range, is called the span. The minimum value and maximum value are called the left span and right span respectively.

2.3 Data-Saving Function

Saving Data and Saving Method

Saving Media

The instrument can use the following media to save data:

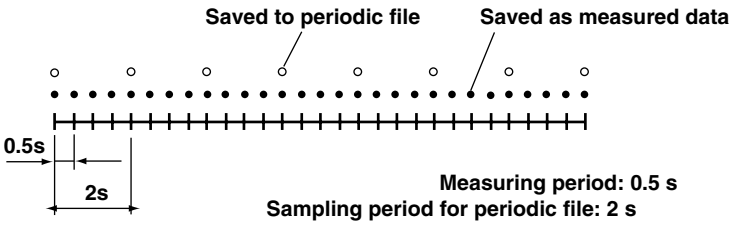
- Built-in RAM disk (standard - 1 MB; optional - 2 MB or 4 MB)
- 3.5-inch floppy disk
- Magneto optical disk (MO), ZIP or PD (when SCSI option /C5 is installed)

Saving Object Data

- Measured data/computed data
- Setting data (set value in SET or SETUP mode)
- Report computed data (when report function /M3 is installed)
- Periodic file (when report function /M3 is installed)

Saving Method

- Measured data/computed data
  These are saved in the built-in RAM disk. If they are to be saved on a floppy disk, MO, ZIP or PD, copy the data in the RAM disk to the floppy disk, MO, ZIP or PD. The data format is binary (extension: .DAT). When saving on a floppy disk, MO, ZIP or PD, the data may also be copied after being converted to ASCII format (extension: .CSV).
- Setting data
  These are directly saved on a floppy disk, MO, ZIP or PD. Also, those data are read from the floppy disk, MO, ZIP or PD to the collector itself. The data format is ASCII (extension: .PNL or .SET).
- Report Data
  Report data are saved to the built-in RAM disk. To save the data to the floppy disk, MO, ZIP or PD disk, copy the data from the RAM disk. Data format is binary. The file extensions are as follows.
  Hourly, daily, monthly reports : RBI
  The following types of report data files are available.
  Hourly report: The instantaneous value at the time of the report and the average/maximum/minimum value over an hour, or the instantaneous value at the time of the report and the integrated value/sum of the integrated values over an hour.
  Daily report: The instantaneous value at the time of the report and the average/maximum/minimum value over a day, or the instantaneous value at the time of the report and the integrated value/sum of the integrated values over a day.
  Monthly report: The instantaneous value at the time of the report and the average/maximum/minimum value over a month, or the instantaneous value at the time of the report and the integrated value/sum of the integrated values over a month.
- Periodic File
  Periodic file is saved to the built-in RAM disk. To save the data to the floppy disk or MO/ZIP/PD disk, copy the data from the RAM disk. Data format is binary (.DAS extension). The data can be also converted to ASCII format when copying to the floppy disk or MO/ZIP/PD disk (.CSV extension).
  Periodic file reduces the number of measured data for saving. The measured data over a day, hour, or month are saved to one file. Periodic files are convenient for obtaining the overall trend of the data being measured.



You can use the event/action function to save the data to the periodic file under normal conditions and switch to save at measuring periods when a certain event occurs. The setting example for writing the data using the event/action function is given in Section 6.4, “Setting Writing Operation of Periodic File/Report Data.”
The file extension is “.DAS.”

Start/Stop of Writing Measured/Computed Data, Report data and Periodic File

The method of data-writing in the built-in RAM disk includes that of starting writing using the event/action function, in addition to the method to start/stop it by key operation. In the event/action function, the writing start, suspension/restart, and writing start trigger can be set as actions.

Writing Action

Writing Channel Setting

Measured/computed data

Whether to execute writing or not can be set for each channel.

Periodic Files

Data on the measured/computed data channels are written.

Report Data

Assigns which channel to write to the report channel.

Writing Mode

The data writing method can be selected from the following:

- SINGLE: Data for one file are written (Only for measured/computed data).
- REPEAT: Data are written in such a manner that, when data writing for one file is finished, the next file is prepared and writing continues.

RAM Disk Usage

Built-in RAM disk usage can be selected from the following:

- Measured/computed data
  - Division: The built-in RAM disk is used by dividing it into 2 (cannot be selected on a 4-MB RAM disk), 4, 8, or 16 parts.
  - Data length: The disk is used by specifying the number of data items per channel. From 10 to 100000 data items can be specified. However, a file exceeding 1 MB cannot be prepared.
- Report Data, Periodic File
  Files are created until the built-in RAM disk becomes full.
- Using Built-in RAM Disk
  If the instrument is equipped with the report option (/M3), partition the built-in RAM as follows.

Built-in RAM Capacity	Measured/Computed Data	Report Data
1 MB	512 KB	512 KB
2 MB	1 MB	1 MB
4 MB	3 MB	1 MB

Built-in RAM Capacity	Measured/Computed Data	Periodic File
1 MB	512 KB	512 KB
2 MB	1 MB	1 MB
4 MB	2 MB	2 MB

You can use the entire RAM disk for saving report data or periodic file by not saving measured/computed data.

Report data and periodic file cannot be saved simultaneously.

Setting of the Use of Trigger

Set the trigger mode if the writing start trigger is to be set using the event/action function.

Pretrigger

In the trigger mode, the measured/computed data before generating an event (trigger) can also be stored in part of a file ro an entire file.

Writing Period

Measured/computed data

Time interval of data writing (writing period) can be set. The writing period can selected from the measuring period, 1 s to 60 min., and LOGIC. However, set the writing period to integer multiples of the scan interval.

Report Data

Statistics of measured/computed data are saved as report data at the specified times.

Periodic File

Data are written according to the specified sampling period. Set whether to save the data hourly(one o'clock, two o'clock,...), daily, or monthly. The time for saving the data daily and monthly is the same as the time for creating report files.

Selection of Writing Object Data

To write all data or to write data from all channels except SKIP only when an alarm is generated in even one channel can be selected.

Copying Measured/Computed Data File, Report File and Periodic File

For copying data from the built-in RAM disk to a floppy disk, MO, ZIP or PD, there are two methods of using key operations and automatic copying using the event/action function. In automatic copying, only binary data apply, copying by converting data to ASCII format is not permitted.

Report data cannot be converted to ASCII and copied.

Writing Measured/Computed Data for One Scan

Using the event/action function, measured/computed data for one scan held in key operations or in generating an event can also be written.

Saving/Reading Setting Data

In SET or SETUP mode, each setting data item can be saved on a floppy disk, MO, ZIP or PD or read from a floppy disk, MO, ZIP or PD to the instrument. Setting data in Monitor mode can be read using the event/action function in addition to key operations.

Method of Specifying File Name

Measured/computed data

Whether a file name for measured/computed data is set automatically or freely specified by the user can be selected. A file name for setting data is freely specified by the user. The file extension is set automatically depending on the file content.

Report Data, Periodic File

File names are set automatically.

Operation in File Saving/File Alarm Function

Continuing Operation if the Writing Mode is REPEAT

In saving data by dividing the built-in RAM disk area with the writing mode set at REPEAT, if there is no free area, whether or not to continue writing by clearing the file with the oldest data and time can be set (five oldest files for periodic files).

Overwriting Operation If Files with the Same Name Exist

If there are files with the same name at the start of measured/computed data writing, whether the file is overwritten or the writing operation is suspended can be set.

File Cancellation When Copying is Done

When copying files in the built-in RAM disk to a floppy disk, whether a file in the copying source is cancelled or not at the same time as copying can be set.

File Alarm Function

If the remaining capacity of the file decreases below the corresponding specified time while writing measured/computed data, a file alarm is output from a relay (see 2-13).

2.4 Alarm Function

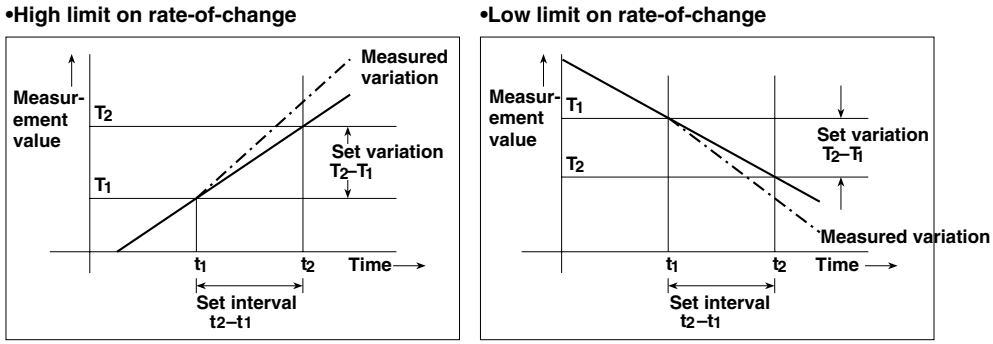
This function will show an alarm on the display or generate an alarm output signal when the measurement conditions of a channel exceed/fall below preset values. Up to four alarms can be set for each channel. Alarms can be set up to 4 items per channel.

Type of Alarms

Six types of alarms are available, namely high limit alarm, low limit alarm, high limit on rate-of-change, low limit on rate-of-change, difference high limit and difference low limit.

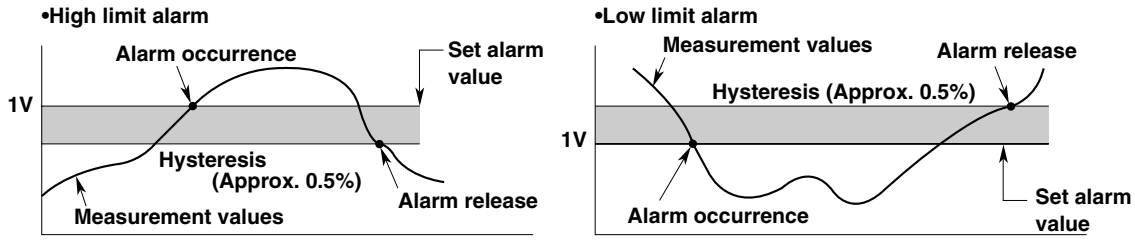
Interval for Rate-of-Change Alarms

In case of high/low limit on rate-of-change alarms, variation is measured over a preset interval, and if the variation exceeds a preset value, an alarm occurs. This interval can be set and applies to all channels.



Alarm Hysteresis

You can set the width between the value of alarm occurrence and its release. This setting prevents frequent alarm occurrences/releases in an unstable environment. Hysteresis values can be set in the 0-1% percentage range of the span. The hysteresis setting is used for high and low limit alarms.



Internal Switches

Sixty internal switches are provided which can be operated upon alarm occurrences. These switches are only for internal operations and are used in combination with the event/action function (refer to page 2-12).

Alarm Output Relays

The alarm module or the DI/DO module includes an alarm output relay. The contact of this relay can be output to the outside. For how to mount modules, see 3.3, “How to Connect Input/Output Modules” (page 3-6).

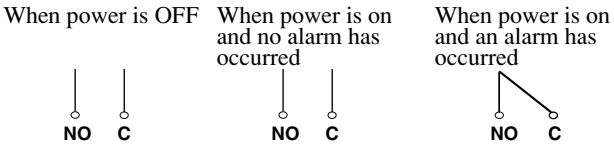
Operation Mode

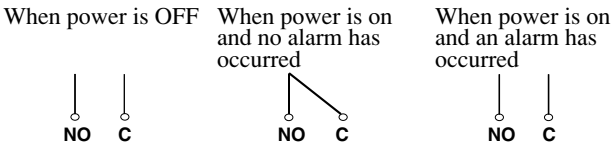
Energizing/De-energizing Setting

The alarm output relays can be selected to be energized or de-energized on alarm occurrence. Using de-energizing, the alarm output relay will be activated when the power drops in the same way as when an alarm occurs. This setting can be done for each relay individually.

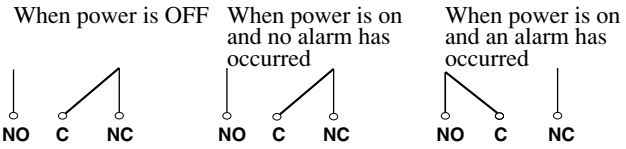
Relay contacts in case of energizing

A-contact

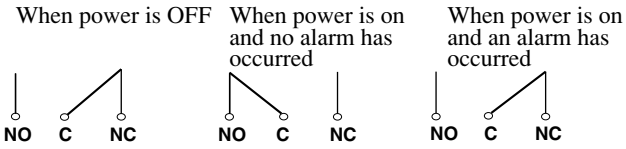




C-contact



Relay contacts in case of de-energizing

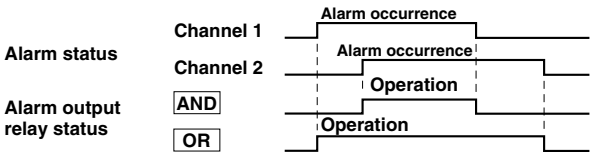


AND/OR Setting

When a group of alarms share the same internal switch or alarm output relay, you can select how the internal switches/alarm output relays will be operated.

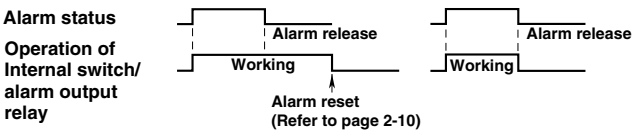
AND: will be operated when all alarms are occurring;

OR: will be operated when at least one alarm is occurring.



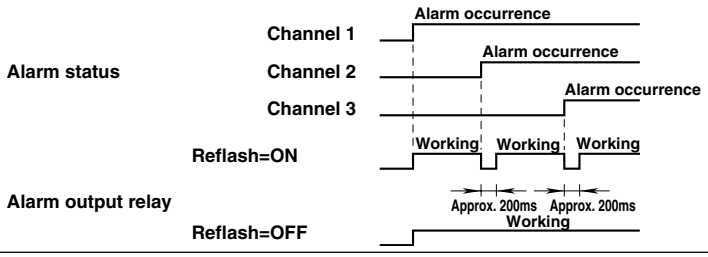
HOLD/NON-HOLD Setting

You can select whether to hold the operating status of operated internal switches or alarm output relays. This setting applies to both the internal switches and the alarm output relays.



Reflashing Alarm Setting

When several alarms share the same alarm output relay, you can select this setting which results in a short de-operation of the relay when a second alarm occurs.



Displaying Alarm Information

Alarm Indicator

"ALARM" Indicator

When at least one alarm occurs, the "ALARM" indicator at the right of the display will light.

Display per Channel

In sub-display 1 or 2, the alarm statuses of a maximum of 30 channels (according to the specifications) can be displayed (refer to page 2-1). Besides, when the measurement value of a channel where an alarm occurred is being displayed, the type of alarm will appear between the channel number and the measurement value.

Channel No.	Type of alarm	Measurement value
001	H	10.000mV

Alarm Display Hold Function

This function allows the alarm display to remain even when the alarm has already been released. This function can be selected ON or OFF and applies to all alarms. When the function is set to ON, if an alarm occurs, the alarm display flashes.

Alarm Acknowledge Function

This function only resets the display and therefore allows you to verify the current alarm status on the display. When the alarm display hold function is ON, selecting the ALARM ACK menu results the alarm display changing from flashing to lit and will turn off when the alarm is released. This setting applies to all alarms.

Alarm Reset

You can reset the internal switches and alarm output relays and the corresponding displays. The previously mentioned alarm acknowledge function has the same function as resetting the alarm display here. Resetting the internal switches and alarm output relays when the relay hold function is set to ON has the following affects and depends on the alarm status.

- when alarms occur continuously, the internal switches/alarm output relays will turn to their non-operative status for a short period but soon change into their operation status.
- when alarms are released, the internal switches/alarm output relays turn to their non-operative status.

2.5 Standard Computation Functions

Standard computations such as difference between channels and linear scaling can be set with measurement input settings. A moving average computation is also available.

Difference between Channels

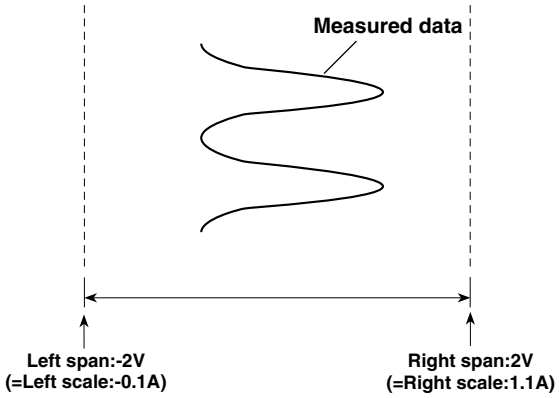
This function computes the difference between the measurement values of a selected channel (=reference channel) and any other channel (=destination channel). This can be applied to each channel in the same unit. The computation formula is as follows:

Result of difference between channels computation = measurement values of destination channel — measurement values of reference channel

Linear Scaling

This function changes the left and right span set with the span to left and right scale values which are converted to a different physical quantity. This can be applied to each channel and a different engineering unit can be entered for display.

Example where voltage values are converted into linear scaling values



Moving Average

This function computes a moving average over a preset number of (K) measurement values. This function is useful for displaying and saving of unsteady measurement values. The computation formula is as follows.

$$D_m = (M_{m-(K-1)} + M_{m-(K-2)} + \ldots + M_{m-2} + M_{m-1} + M_m) / K$$

where

D_m : "m"th average value

$M_{m-(K-1)}$: the measurement value of the "K-1"th measurement before the "m"th measurement

$M_{m-(K-2)}$: the measurement value of the "K-2"th measurement before the "m"th measurement

. .
. .

M_{m-2} : the measurement value of the second last measurement before the "m"th measurement

M_{m-1} : the measurement value of the last measurement before the "m"th measurement

M_m : the measurement value of the "m"th measurement

K : number of samples, and an integer ranging from 2 to 64

At the first computation, the measurement value of the first measurement will be multiplied by the number of samples, after which the average will be taken. The measurement values of the second and later measurements will replace these in turn, after which the average will be calculated each time.

2.6 Other Functions

Event/Action Function

Following the occurrence of an event such as remote control signal (12), alarm, internal switch, file end signal, timer, match time or key operation, any of the following actions can occur.

- **Alarm acknowledge**
  (refer to page 2-10)
- **Alarm reset**
  (refer to page 2-10)
- **Timer reset**
  This instrument can set six timers. There are two timer settings: one is the relative time setting and the other is the absolute time setting. In the relative time setting, a timer is started after the specified numbers of days and hours have elapsed after setting. In the absolute time setting, a timer is started every specified time interval based on the reference instant. A timer reset restores all the relative time setting timers to the state immediately after the setting before the time elapsed.
- **Message display**
  A preset message will be displayed on the main display
- **Starting measured/computed data writing**
  A file is opened and measured/computed data writing starts.
- **Suspension/restart of measured/computed data writing**
  Writing is suspended without closing a file. For level action, suspension and restart are alternately repeated depending on the event generation or reset.
- **Writing start trigger for measured/computed data**
  A trigger to start writing in an opened file is generated.
- **Writing measured/computed data for one scan**
  The measured/computed data for one scan held at an event generation are written.
- **Copying to a floppy disk, MO, ZIP or PD**
  All files in the RAM disk are copied to a floppy disk, MO, ZIP or PD.
  However, if a file with the same file name already exists on the SCSI device, it is not copied.
- **Reading setting data**
  Setting data in SET mode are read into the instrument from a floppy disk, MO, ZIP or PD.
- **Starting/stopping of computation, reset and clear and status clear, group reset**
  This function is available only if the instrument is equipped with the computation function.
  This function enables starting and stopping of computation and resetting and clearing of computed data.
- **Starting/Stopping Reports**
  Valid only for models with the report option.
  Starts or stops the report function.
- **Flag**
  Valid only for models with the computation option (/M1).
  Sets the flag to 1.

Key-Lock Function

This function prevents alterations by careless key operations. When the key-lock function is activated, the indicator “KEYLOCK” at the right side of the display will be lit. All key operations, except power ON/OFF, DISP/MODE key and the cursor, will then be disabled. However, you can preset whether START/STOP/CLOCK/FUNC/FD COPY/M.FUNC keys will remain operable even after key-lock has been set. Furthermore, when activating or releasing the key-lock, a menu for password verification appears to prevent the key-lock to be used by unauthorized operators.

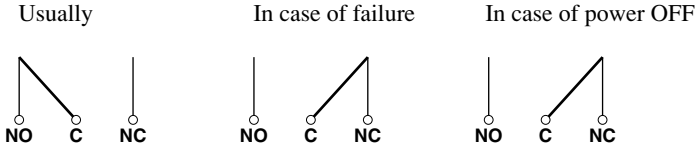
External Input/Output Function (alarm module or DI/DO module is required)

Alarm Output

This output can be performed from the internal relay in the alarm module or the DI/DO module. These relays will be operated when an alarm occurs. For details concerning their settings and their relation with alarms, refer to page 2-9, 2-10.

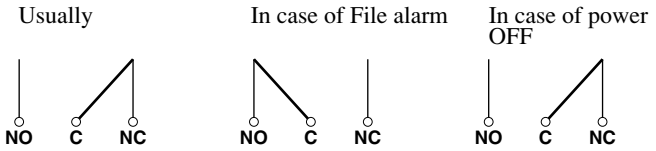
Fail Output

One transfer contact in the DI/DO module is used for fail output. This relay will change to the de-energized status when a failure of the recorder occurs.



File Alarm Output

One transfer contact in the DI/DO module is used for file alarm output. When the remaining capacity of a file decreases below the corresponding specified time, the function is activated. The relay will change to the energized status.



Controlling Data-Savinfg Functions by Remote Control

The data-saving functions can be controlled by inputting up to 12 contact signals to the DI/DO module. You can choose one of the following operations for each of the 12 signals. The remote control function can be one of the events of the event/action function described on the previous page.

- **Alarm acknowledge**
- **Alarm reset**
- **Timer reset**
- **Message display**
- **Measured/computed data writing start**
- **Suspension/restart of measured/computed data writing**
- **Measured/computed data writing start trigger**
- **Writing of measured/computed data for one scan**
- **Copying to a floppy disk**
- **Reading setting data**
- **Starting/Stopping reports**
- **Flag**

Communication Interface (Communication module required)

Either GP-IB interface module, the RS-232-C interface module or RS-422-A/RS-485 interface module can be connected. For details regarding operation and commands, refer to IMDC100-11E.

Retransmission function (Retransmission module required)

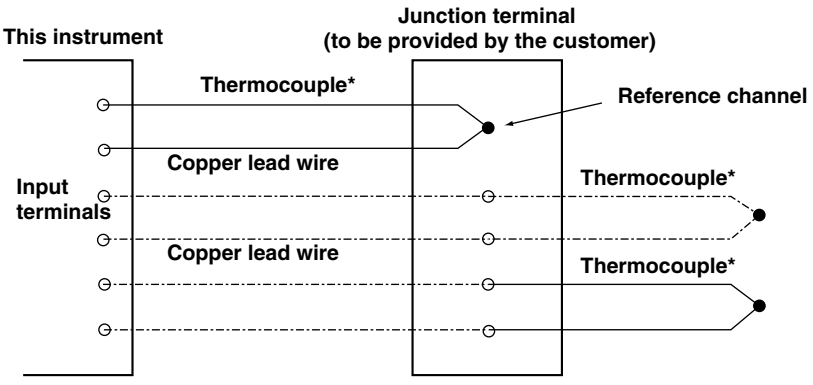
With the left span of the measurement or computation channels set to 1 V or 4 mA and the right span set to 5 V or 20 mA, the voltage or current corresponding to the measured value or computed result can be output from the retransmission module. In addition, for values input via a personal communications, the voltage or current corresponding to the value specified through the communication input can be output from the retransmission module. In this case, the value 0 is set to 1 V or 4 mA, and the value 10000 is set to 5 V or 20 mA.

Computation Function (Option)

This function is available if the instrument is equipped with the computation function (/M model). This function executes the following computations, and displays and saves the results.
Four arithmetical operations (addition, subtraction, multiplication, division), square root, absolute values, common logarithm, natural logarithm, power, logical product, logical sum, exclusive OR, logical negation, statistical operation, relational operation
Up to 30 channels for the stand-alone model, or up to 60 channels for the expadable model can be used for computation. It is also possible to use the event/action function to start/stop computation or clear data for computation channels. Furthermore, up to 4 levels of alarm (upper-limit alarm, lower-limit alarm) can be set for computation channels.

RRJC (Remote RJC, available if the instrument is equipped with the optional MATH function)

In cases where the object is located in distance for temperature measurement using thermocouples, the temperature of the object can be measured without using a number of expensive thermocouples if a junction terminal is installed near the object. This method requires the object to be connected to the terminal via a thermocouple, and the terminal to this instrument via copper lead wires. Furthermore, the junction terminal needs to be connected to an input terminal of this instrument via a thermocouple. The temperature of the junction terminal is then measured to carry out compensation for the reference contact point used for measurement of temperature of the object, then finally temperature of the object is measured.



*** Thermocouples of the same type must be used**

Computing & Report Function (Option)

This function can send out to a communication line the results of a statistical calculation of data on a specified channel (measurement or computation channel), in a format predetermined for a preset time, date or month. The types of computations are averaging (mean value, maximum and minimum), instantaneous value calculation and summation (sum, cumulative sum).
Also, you can reduce the number of measured data and save the data over a certain time (periodic file).

3.1 General Precautions for Installation

Safety Precautions

Read the safety precautions

Make sure to read the safety precautions described on page 7 before using the instrument for the first time.

Do not remove any covers from the instrument

For internal inspection or adjustment, contact your nearest sales representative. Addresses may be found on the back cover of this manual.

In case of malfunctioning

Never continue to use the instrument if there are any symptoms of malfunctioning such as unusual sounds, smell or smoke coming from the instrument. Immediately turn OFF the power and unplug the power cord. When using an adapter for direct wiring to the power supply, immediately turn OFF the power supply. Also disconnect the power to the equipment under measurement. Contact your sales representative or nearest service center. Addresses may be found on the back cover of this manual.

Power Cord

Nothing should be placed on the power cord ; it should also be kept away from any heat sources. When unplugging the power cord from the outlet, never pull the cord itself. Always hold the plug and pull it. If the power cord is damaged, contact your dealer for replacement. Refer to page 3 for the part number when placing an order.

General Handling Precautions

Never place anything on top of the instrument

Never place another instrument or any objects containing water on top of the instrument. Otherwise a failure may occur.

When moving the instrument

First turn off the power of the equipment being measured and disconnect the measurement leadwires and the communication cable. Then turn the power switch of this instrument OFF and unplug the power cord from the outlet. When carrying the instrument, securely hold the instrument with both arms and take care not to drop it.

Ventilation openings

Do not block the ventilation openings in order not to raise the internal temperature.

Electrically charged objects

Don’t bring electrically charged objects near the input terminals. The internal circuitry might be damaged.

Chemicals

Do not pour volatile agents on the case nor leave the case in contact with rubber or PVC products for a long period. The case is made of a thermoplastic resin, so take care not to let anything hot such as a soldering iron touch the case.

Cleaning

When cleaning the case or any other part of the instrument, first remove the power cord from the receptacle (and in case of direct connection, disconnect the power lines). Do not use volatile chemicals since this might result in dis-coloring etc. Always use a dry, soft cloth for cleaning.

When not using the instrument for a long time

When the instrument is not being used for an extensive period of time, unplug the power cord from the outlet (when using an adapter for direct wiring to the power supply, disconnect the power cord from the outlet).

3.2 Installation

Installation Conditions

The instrument must be installed in a location where the following conditions are met.

Ambient temperature and humidity

- Ambient temperature
  Main unit: 5 to 40°C
  Subunit: 0 to 50°C
  However, in case you mount the AC power supply model subunits DS400/DS600 directly to a panel, or if you apply the DIN rail, or mount them in a rack, it is possible to use them in a range of –10 to 60°C.

WARNING

- When the environmental temperature is 50°C or more, the temperature of the rear panel may rise to more than 70°C. Thus, touching the rear panel under these circumstances has the danger of sustaining burns.
- To prevent a fire, always use the instrument in a vertical position, and do not block the upper side of the modules (a space of at least 3 cm is necessary).

- Ambient humidity: 20 to 80%RH for –10 to 40°C, 10 to 50%RH for 40 to 50°C, 5 to 30%RH for 50 to 60°C (However, no condensation should be present.)
- Installation location: Room
- Installation height: Altitude up to 2,000 m

Note

Internal condensation may occur if the instrument is moved to another place where both the ambient temperature and humidity are higher, or if the temperature changes rapidly. In case of thermocouple input, this might result in erroneous measurements. In those cases, allow the instrument to achieve equilibrium with to its new environment for at least one hour before starting operation.

Never install the instrument in any of the following locations:

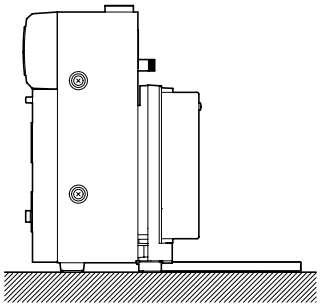
- in direct sunlight or near heat sources
- where an excessive amount of soot, steam, dust or corrosive gases are present
- near strong magnetic field sources
- near high voltage equipment or power lines
- where the level of mechanical vibrations is high
- in an unstable place

Installation Method

DC100

Can be used on a desk-top, installed on the floor, or rack-mounted. Always install the instrument vertically.

- **Desk-top or floor installation**
  Extend the legs underneath the rear of the unit and install the instrument upright on a level floor as shown below.

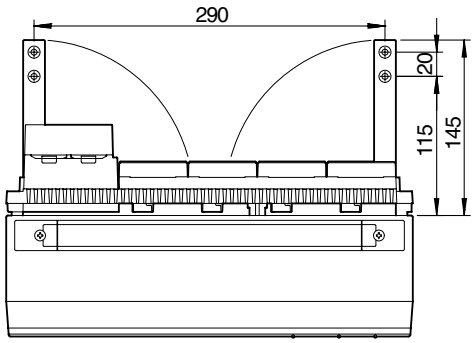


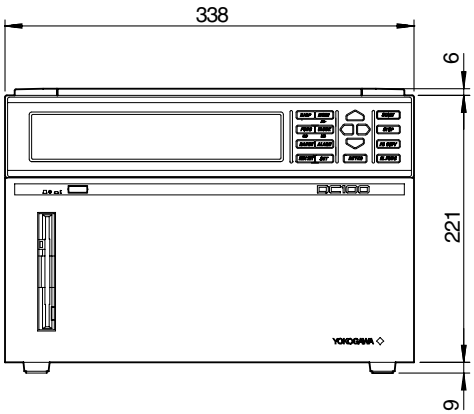
- **Rack mounting**

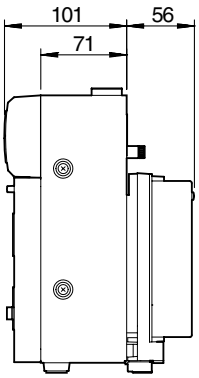
  The following fittings can be supplied for rack mounting.

Name	Model	Description
Rack mounting fitting	DV400-015	Conforming to ANSI/EIA

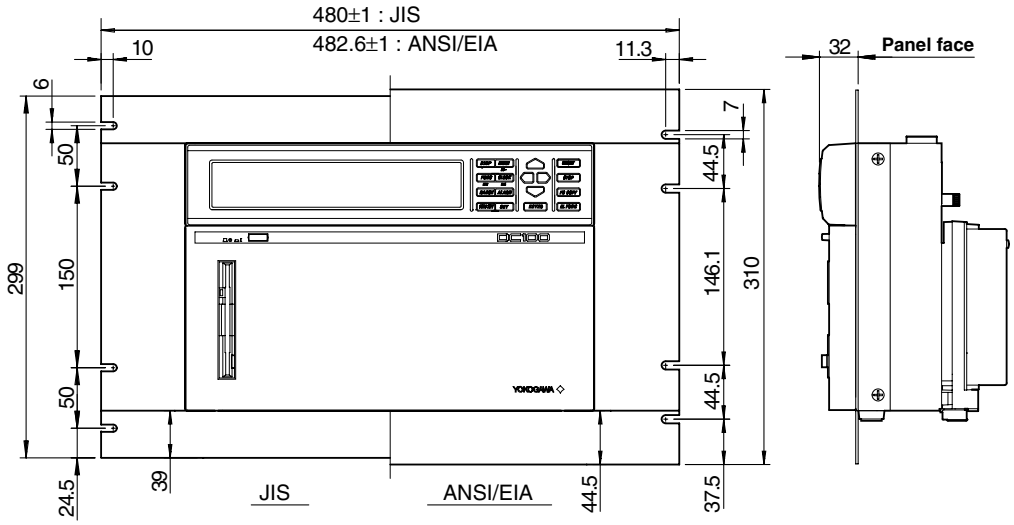
- External dimensions and rack mounting dimensions for the DC100 are shown below.
- To install the rack mounting fitting on the instrument, remove the screws at the right and left forward of the instrument and use the mounting screws attached to the rack mounting fitting. Be careful that right and left screws have different lengths. The screw at the right when facing the front of the instrument is M4 of 20 mm long and the left screw is M4 of 16 mm long. Appropriate tightening torque is 1.4 to 1.5 N·m (14 to 15 kgf·cm).
- If another instrument is to be mounted under this instrument in an ANSI/EIA rack, remove the prong or brackets designated with 1 and 2 in the figure below because they may interfere with both instruments.







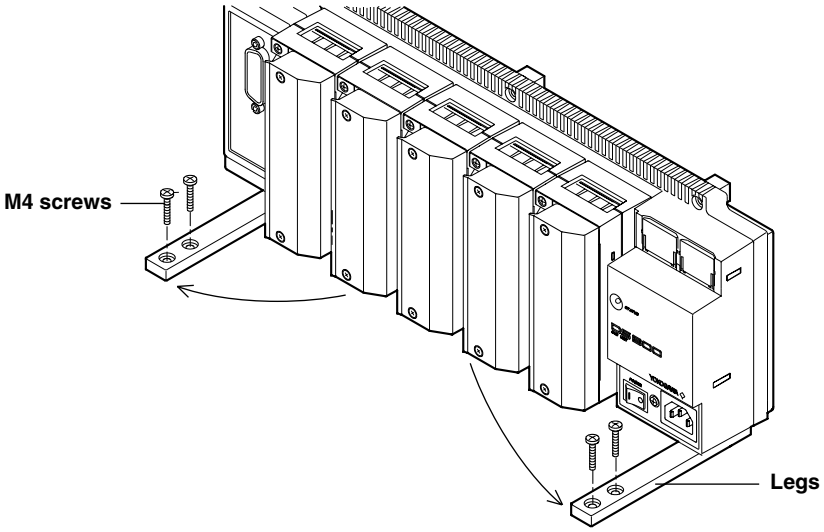
Rack Mounting Dimensions



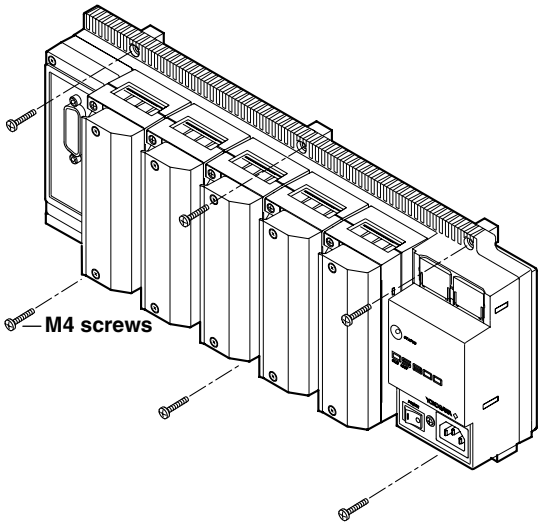
DS400/DS600

The subunit DS400/DS600 can be used on a desk-top, installed on the floor, directly panel-mounted, mounted on DIN rails, or rack-mounted. Always mount the instrument vertically. If the power terminals of the unit are screw terminals, directly mount the unit on the panel to prevent an electric shock.

- **Desk-top use or installed on the floor**
  Extend the legs on the bottom of the unit forward as shown below and place the unit vertically. If the unit could fall when wired, use the through-holes of the legs to fix the legs with the attached four 4-mm screws.



- **Direct panel mounting**
  Following the figure below, fix the unit at six places using the attached screws (length: 16 mm).



- **Mounting on DIN rails**
  For the mounting procedure, see the instruction manual for “DIN rail mounting fitting.”

- **Rack mounting**

  The following fittings are supplied for rack mounting. For details of the mounting procedure, see the instruction manual for "rack mounting fitting."

Name	Model	Description
Rack mounting fitting	DV400-011	For DS400/DS600 conforming to ANSI/EIA

3.3 How to Connect the Input/Output Modules

WARNING

When connecting the Input/Output modules, make sure to turn OFF the power to the DC100/DS400/DS600 to prevent an electric shock or damage to the instrument.

Setting the Unit Number of each Subunit (only for the use with the DC100 expadable model)

When connecting subunits to the DC100 expandable model, it is necessary to assign a distinctive unit-number to each subunit. This number can be selected from 0 to 5 (the setting 6 and up will not be recognized) and is set, as shown in the figure below, by a setting switch (rotary dipswitch).

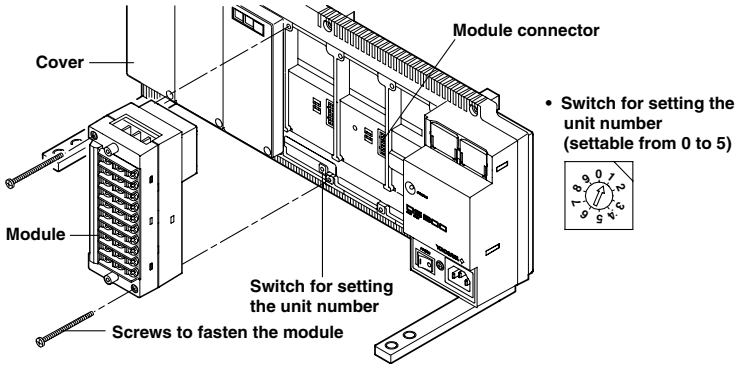
Note

When you connect an input/output module at the location of the setting switch, the switch can not be operated anymore. Therefore, make sure you set the switch before connecting any input/output module there.

It is convenient for confirming unit numbers to write each unit number setting on the gray concave surface at the top of DS600 subunit (or on the left side of DS400 subunit).

Connecting Method

1. Verify that the power to the DC100/DS400/DS600 has been turned OFF.
2. Remove the cover of the location where the module will be connected. Do not remove any cover of locations where no module will be connected.
3. Hold the module so that the male part of the connector at the back side of the module matches the female part of the receiving connector. Then connect the module.
4. Fasten the module by fastening the two accessory M3 screws.



Modules Which Can be Used

- **DC100 stand-alone model**

  Input module, alarm module, DI/DO module, communication interface module or retransmission module

  Number of total modules that can be connected: 4

  Number of DI/DO modules that can be connected is up to 1.

  Number of input modules ≤ 4 (maximum number of input channels: 40)

  Number of input modules + number of alarm modules + number of DI/DO modules + number of communication interface modules + number of retransmission modules ≤ 4

- **DC100 expandable model**

  Not more than one DI/DO module can be connected to all units.

- Main unit

  Alarm module, DI/DO module, or communication interface module

  (Note: The input module or retransmission module cannot be connected.)

  Number of total modules that can be connected: 4

  Number of alarm modules + number of DI/DO modules + number of communication interface modules ≤ 4

- Subunit (DS400/DS600)

  Input module, alarm module, DI/DO module, or restransmission module

  Number of total modules that can be connected: 4 for DS400, 6 for DS600 (maximum number of input channels: 300)

  DS400: Number of input modules + number of alarm modules + number of DI/DO modules + number of retransmission module ≤ 4

  DS600: Number of input modules + number of alarm modules + number of DI/DO modules + number of retransmission module ≤ 6

Note

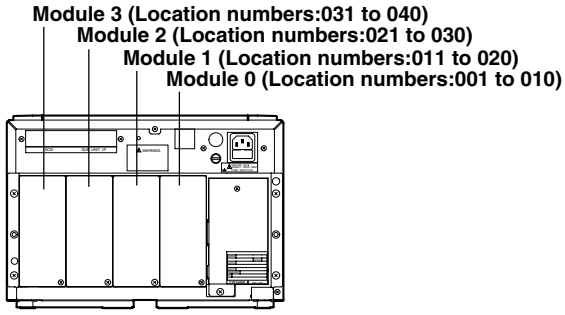
- No alarm module or DI/DO module can be connected to the right side of an input module, since the rise in temperature would hinder the measurement accuracy.
- When mounting universal and power modules, or DCV/TC/DI and Power modules together, keep the two modules apart at a distance of at least one module width. If you mount the power module immediately beside the universal and DCV/TC/DI module, the measuring accuracy of the universal module may fall out of its guaranteed range because of the heat radiating from the power module.
- No retransmission module can be connected to the right side of universal input module, DCV/TC/DI module, since the rise in temperature would hinder the measurement accuracy.
- Verify the type of module by the seal on the top side.

Location and Location Number (Channel Number, Alarm Output Relay Number, DI/DO Number)

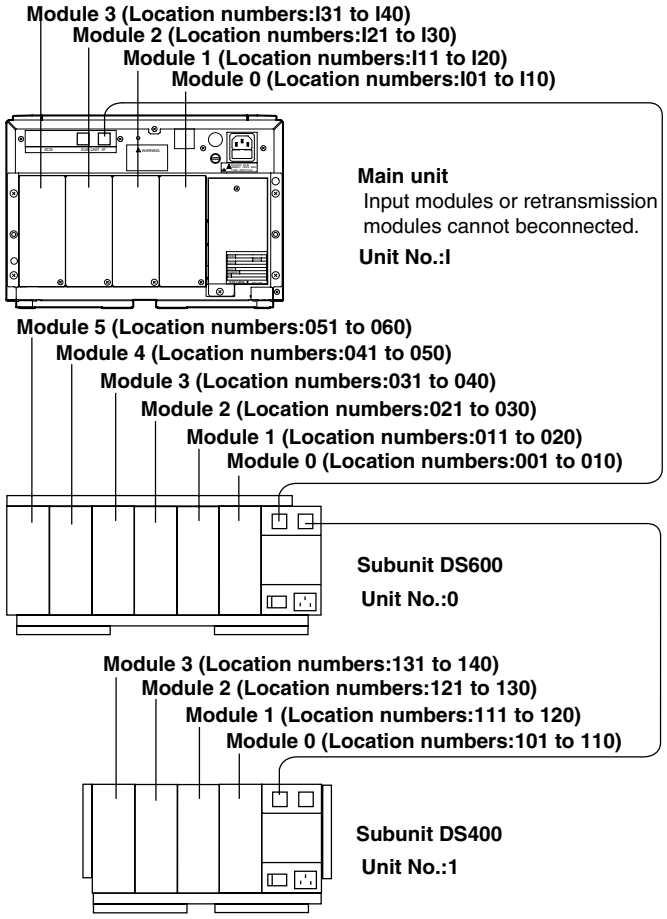
The location numbers correspond to channel numbers for locations where the input module is connected, to alarm output relay numbers for locations where the alarm module is connected, and to DI/DO numbers for locations where the DI/DO module is connected.
Modules are mounted on a unit in slots. The number of each module is the same as that of the slot.

- **DC100 Stand-alone model**
  The location numbers correspond to the location of each module as shown in the figure below.
- **DC100 Expandable model**
  As shown below, input/output location numbers are assigned related to the unit number (see the previous page; the main unit number is fixed at I) and module location.

DC100 Stand-alone model



DC100 Expandable model



Note

When the following handling is done, it is necessary to carry out "system structuring" to operate the instrument correctly. After executing system structuring, confirm the module information. For details, see page 9-16.

· Connection (including addition or replacement)/removal of subunits, or unit number setting (see page 3-6)
· Mounting (including addition or replacement)/removal of modules

3.4 Connecting the Interface Cables

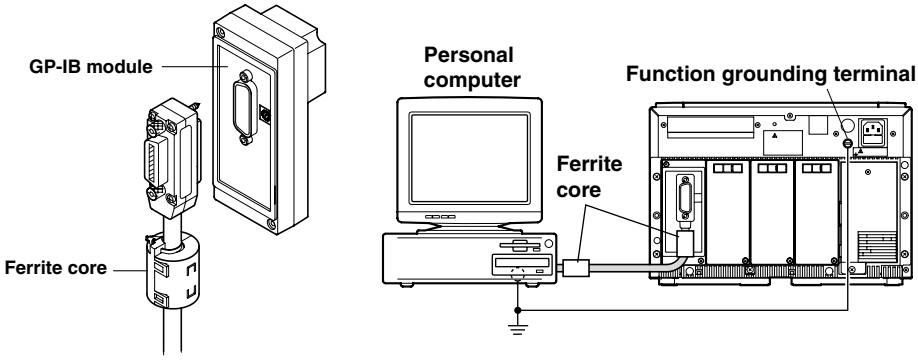
When connecting a personal computer to the instrument via a communication interface, observe the following:

GP-IB

The GP-IB connector of the GP-IB communication module is a 24-pin connector of IEEE St'd 488-1978. Only use cables that conform to IEEE St'd 488-1978 as a communication cable.

Connection Procedure

Connect the cable as shown in the figure below.

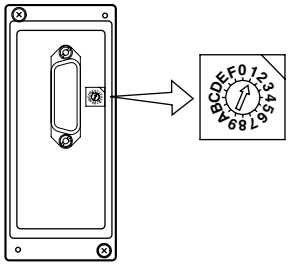


•When connecting the cable, take note of the following.

- To reduce noise, use two ferrite cores (e.g., ZCAT 3035-1330 from TDK) at both ends of the interface cable as shown above.
- Securely tighten the screws which fasten the GP-IB cable connector.
- If more than one equipment is connected, the same addresses cannot be assigned to different equipment.
- Use only cables of 2 m or less to interconnect each equipment.

How to Assign an Address

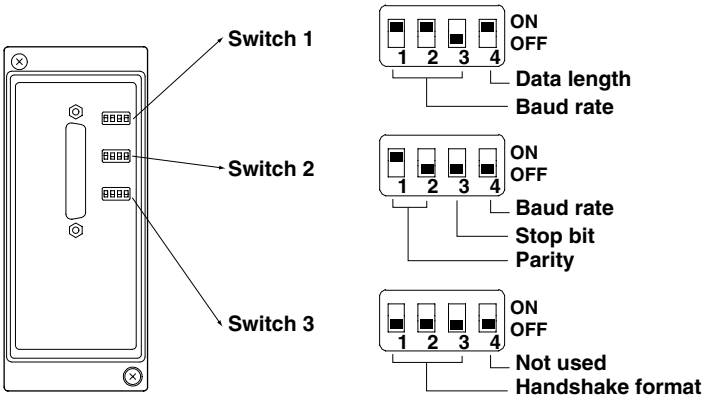
The address can be assigned easily by turning the rotary dipswitch as shown in the figure below. Any address can be set from "0" to "15"; the characters "A" to "F" on the dipswitch correspond to the address "10" to "15" respectively.



RS-232-C

Communication Settings

Communication parameters are set using the three switches located on the RS-232-C modules.



Switch 1 and No. 4 of Switch 2

Baud rate	dipswitch	No.1	No.2	No.3	No.4 (Switch 2)	
150		OFF	OFF	OFF	OFF	
300		OFF	OFF	ON	OFF	
600		OFF	ON	OFF	OFF	
1200		OFF	ON	ON	OFF	
2400		ON	OFF	OFF	OFF	
4800		ON	OFF	ON	OFF	
9600		ON	ON	OFF	OFF	←Default setting
19200		ON	ON	ON	OFF	
38400		OFF	OFF	OFF	ON	

Data length	dipswitch	No.4	
7		OFF	
8		ON	←Default setting

Switch 2

Parity	dipswitch	No.1	No.2	
NONE		OFF	OFF	
ODD		OFF	ON	
EVEN		ON	OFF	←Default setting

Stop bit	dipswitch	No.3	
1		OFF	←Default setting
2		ON	

Switch 3

Handshake format	dipswitch	No.1	No.2	No.3	
no handshake		OFF	OFF	OFF	←Default setting
XON-DTR*		OFF	OFF	ON	
XON-RTS*		OFF	ON	OFF	
CTS-DTR		OFF	ON	ON	
CTS-RTS		ON	OFF	OFF	

* When the baud rate is set to 38400, there is no handsake.

Note

When you are using the accessory standard software, the settings should be as follows: baud rate 2400 to 19200 bps, data length: 8 bit, parity: ODD, stop bit: 1.

Connecting the RS-232-C cable

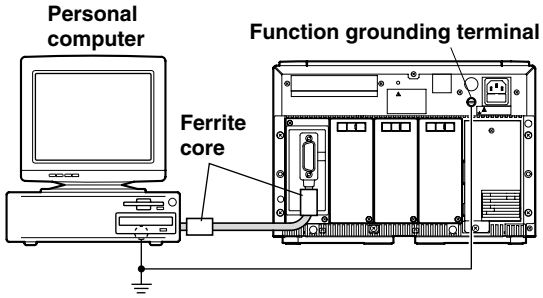
For details on connecting the RS-232-C connector of the RS-232-C communication interface module to a personal computer, see IM DC100-11E, "DC100 Communication Interface User's Manual."

CAUTION

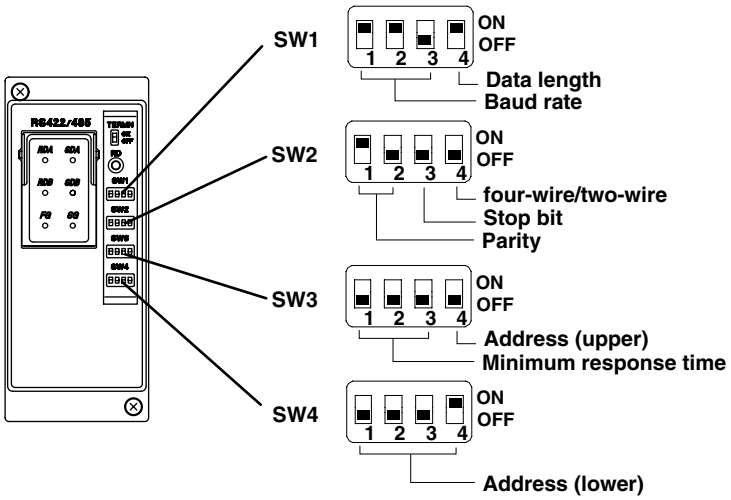
When (dis)connecting the RS-232-C cable, turn OFF the power of both the personal computer and the instrument. If the power is not turned OFF, malfunctions may occur and the internal circuitry may be damaged.

Note

To reduce noise, use ferrite cores (e.g., ZCAT 3035-1330 from TDK) for the interface cable as shown below. Two ferrite cores should be installed near both ends of the interface cable. If the noise is particularly bad, use several ferrite cores in series. Use a shielded cable for the interface cable and make a one-point grounding at the function grounding terminal of this instrument together with the functional-ground terminal of the personal computer.



RS-422-A/RS-485



Baud rate (No.1 to 3 of SW1)

Baud rate	No.1	No.2	No.3	
300	OFF	OFF	ON	
600	OFF	ON	OFF	
1200	OFF	ON	ON	
2400	ON	OFF	OFF	
4800	ON	OFF	ON	
9600	ON	ON	OFF	←Default Setting
19200	ON	ON	ON	
38400	OFF	OFF	OFF	

Data length (No.4 of SW1)

Data length	No.4	
7	OFF	
8	ON	←Default Setting

Parity (No.1 to 2 of SW2)

Parity	No.1	No.2	
None	OFF	OFF	
ODD	OFF	ON	
EVEN	ON	OFF	←Default Setting

Stop bit (No.3 of SW2)

Stop bit	No.3	
1	OFF	←Default Setting
2	ON	

Switch between four-wire/two-wire systems (No.4 of SW2)

four-wire/two-wire	No.4	
four-wire	OFF	←Default Setting
two-wire	ON	

Minimum response time (No.1 to 3 of SW3)

Minimum response time	No.1	No.2	No.3	
0ms	OFF	OFF	OFF	←Default Setting
10ms	OFF	OFF	ON	
20ms	OFF	ON	OFF	
50ms	OFF	ON	ON	
100ms	ON	OFF	OFF	

Address (No.4 of SW3 and No.1 to 4 of SW4)

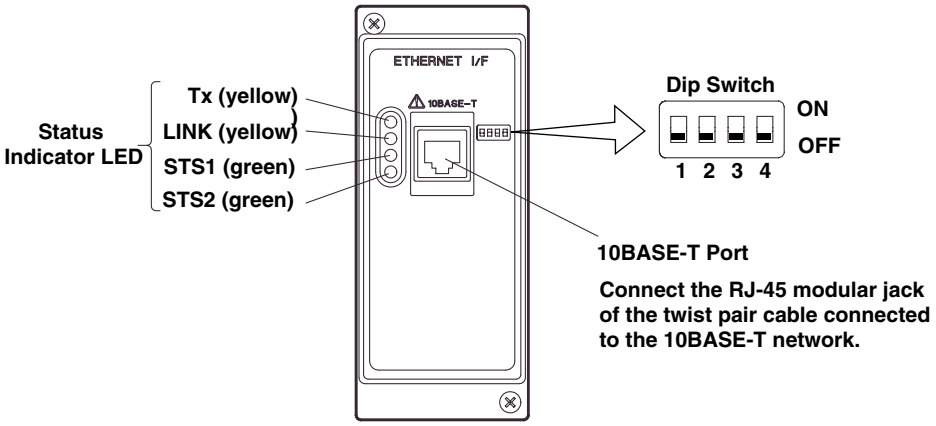
Address	No.4(SW3)	No.1(SW4)	No.2(SW4)	No.3(SW4)	No.4(SW4)	
1	OFF	OFF	OFF	OFF	ON	←Default Setting
2	OFF	OFF	OFF	ON	OFF	
3	OFF	OFF	OFF	ON	ON	
4	OFF	OFF	ON	OFF	OFF	
5	OFF	OFF	ON	OFF	ON	
6	OFF	OFF	ON	ON	OFF	
7	OFF	OFF	ON	ON	ON	
8	OFF	ON	OFF	OFF	OFF	
9	OFF	ON	OFF	OFF	ON	
10	OFF	ON	OFF	ON	OFF	
11	OFF	ON	OFF	ON	ON	
12	OFF	ON	ON	OFF	OFF	
13	OFF	ON	ON	OFF	ON	
14	OFF	ON	ON	ON	OFF	
15	OFF	ON	ON	ON	ON	
16	ON	OFF	OFF	OFF	OFF	
17	ON	OFF	OFF	OFF	ON	
18	ON	OFF	OFF	ON	OFF	
19	ON	OFF	OFF	ON	ON	
20	ON	OFF	ON	OFF	OFF	
21	ON	OFF	ON	OFF	ON	
22	ON	OFF	ON	ON	OFF	
23	ON	OFF	ON	ON	ON	
24	ON	ON	OFF	OFF	OFF	
25	ON	ON	OFF	OFF	ON	
26	ON	ON	OFF	ON	OFF	
27	ON	ON	OFF	ON	ON	
28	ON	ON	ON	OFF	OFF	
29	ON	ON	ON	OFF	ON	
30	ON	ON	ON	ON	OFF	
31	ON	ON	ON	ON	ON	

For details on connectin the RS-422-A/RS-485 connector of the RS-422-A/RS-485 communication interface module to a personal computer, see IM DC100-11E, "DC100 Communication Interface User's Manual."

CAUTION

When (dis) connecting the RS-422-A/RS-485 cable, turn OFF the power of both the personal computer and the instrument. If the power is not turned OFF, malfunctions may occur and the internal circuitry may be damaged.

Ethernet



You can select the following three modes by setting the dip switch.

Configuration mode: A mode in which the IP address, subnet mask, and default gateway are set for theDC100.

Test mode: A mode in which the condition of the physical connection is tested.

Communication mode: A mode in which the DC100 is connected to the network to carry out communication. Use this mode to read in the DC100 measurement data with the PC.

In addition, you can turn ON/OFF the Keepalive function.

Mode Setting

Mode	Switch 1	Switch 2	
Configuration mode	ON	OFF	
Test mode	OFF	ON	
Communication mode	OFF	OFF	←Default Setting

Do not set both dip switches, 1 and 2, to ON.

Keepalive Setting

Keepalive	Switch 3	
Enable	ON	←Default Setting
Disable	OFF	

Keepalive is a function supported by TCP. It sends packets at constant time intervals and automatically disconnects when there is no corresponding response. This instrument sends packets at 30-second time intervals. If a response is not received, it sends 4 more packets at one-second intervals. If a response is still not received, the connection is dropped.

Have dip switch 4 turned OFF.

3.5 Connecting the Extension Cables (only for the use with the DC100 expandable model)

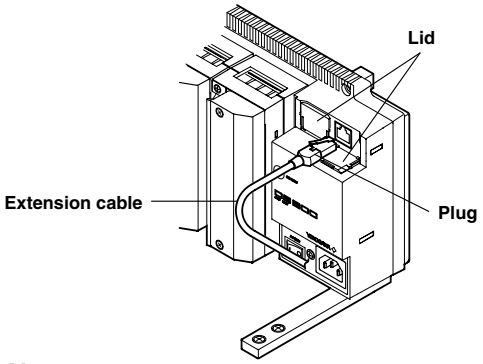
Extension Cables

Any of the following extension cables can be used for connections between the DC100 main unit and subunits or for connections between subunits.

Name	Model	Description
Extension cable	DV200-000	Length: 0.5 m
Extension cable	DV200-001	Length: 1 m
Extension cable	DV200-002	Length: 2 m
Extension cable	DV200-005	Length: 5 m
Extension cable	DV200-010	Length: 10 m
Extension cable	DV200-020	Length: 20 m
Extension cable	DV200-050	Length: 50 m
Extension cable	DV200-100	Length: 100 m
Extension cable	DV200-200	Length: 200 m
Extension cable	DV200-300	Length: 300 m
Extension cable	DV200-400	Length: 400 m
Extension cable	DV200-500	Length: 500 m

Connecting Procedure

Insert the plug of the extension cable in the connector until you hear a click. Since both connectors are identical, it makes no difference which connector you use. Furthermore, since both plugs of the cable are identical, you may use either end.
When pulling the plug from the connector, gently press the peg of the plug and pull it forward.



Note

When the following handling is done, it is necessary to carry out "system structuring" to operate the instrument correctly. After executing system structuring, confirm the module information. For details, see page 9-16.

- Connection (including addition or replacement)/removal of subunits, or unit number setting (see page 3-6)
- Mounting (including addition or replacement)/removal of modules

Points to Note when Using the Extension Cables

- The maximum rated temperature is 60°C;
- Never disconnect the extension cable from the connector by pulling the cable, since this might damage the signal cable. Always hold the plug.
- When wiring the extension cable through a cable duct, or metal pipe or such, protect the peg on top of the plug by covering it with tape.
- For extension cables of longer than 50 m connect the plug with copper foil directed towards the main unit DC100. Applying it in reverse direction might increase noise.
- Fasten the cabels in such a way that no force is applied to the connector or the plug.
- To prevent the wire from snapping, etc. do no apply a tensile force of more than 70N. Furthermore, do not bend the cable in a radius of 3 centimeters or less.
- For the environmental conditions for wiring, refer to Section 3.12, "Countering Noise" (page 3-34).

Note

When several subunits are connected, and the power is turned off of one of them, the other connected subunits which are further away from the main unit will not be recognized anymore.

3.6 Connecting the Signal Lines

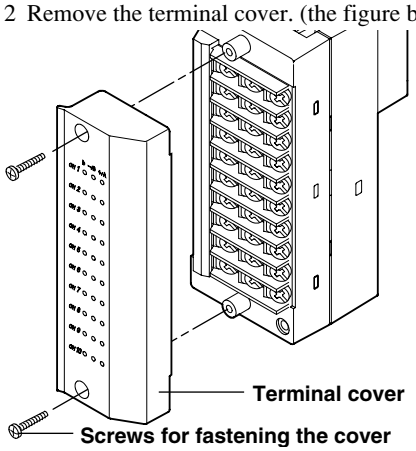
WARNING

- To prevent electric shock, always make sure that the power supply is turned OFF before connecting.
- When 30 VAC or 60 VDC and more is applied to the output terminal of the alarm module or the output terminal of the DI/DO module, use double-insulated wires (withstand voltage performance: more than 2300 VAC) for those wires which apply 30 VAC or 60 VDC and more. All other wires can be basic-insulated (withstand voltage performance: more than 1350 VAC). Furthermore, use “crimp-on” lugs (for 4-mm screws) with insulation sleeves for connecting to the screw terminal. Make sure that the crimp-on tool must be one specified by the crimp-on lugs manufacture, and that the crimp-on lugs and tool must be matched to the wire size.
- To avoid electrical shock, ALWAYS attach the terminal cover in place after the completion of wiring to the terminals so that the terminals cannot be accidentally touched.

CAUTION

- Do not apply an input voltage exceeding the following levels to each terminal of the module. Otherwise, the internal circuits may be damaged.
  Universal, DCV/TC DI and digital input modules
  Allowable input voltage
  2 VDC range or less, RTD, TC and DI (CONT): ±10 VDC
  6 to 20 VDC range, DI (LEVEL): ±60 VDC
  Max. common mode noise voltage : 250 VAC rms (50/60 Hz)
  mA input module
  5 VDC
  Strain input module
  Don’t input voltage to the termial
  Pluse input module
  5 VDC
  Digital input of DI/DO module
  –2 VDC to 7 VDC
- The contact capacity of the alarm module and the digital out of DI/DO module is as follows:
  250 VDC/0.1 A (with a resistor load), 250 VDC/2 A (with a resistor load), 30 VDC/2 A (with a resisitor load)
- The overvoltage category of each input module is CAT II (IEC 1010-1).

1 Check that the power switch of this instrument is turned off.
2 Remove the terminal cover. (the figure below shows DU100-11.)



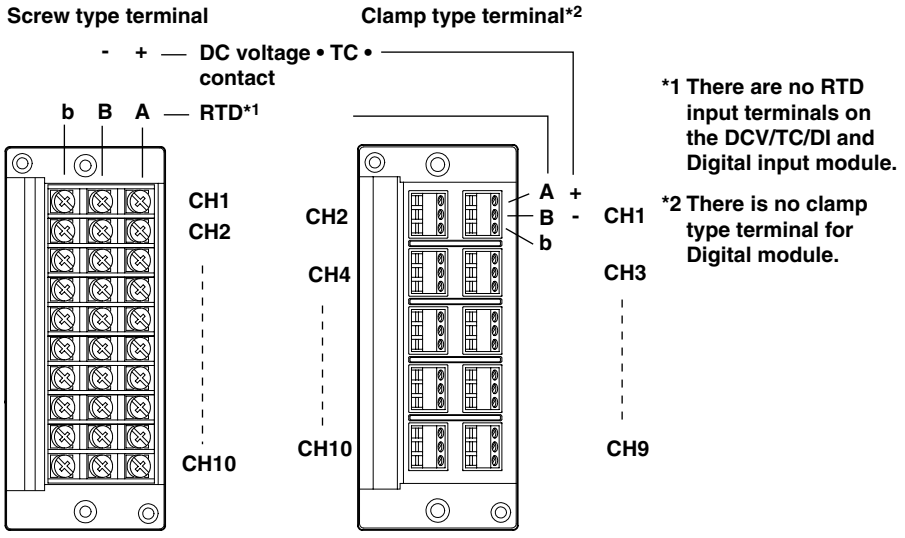
3 Fasten the signal wires to the terminals as shown in the figure on the next page.
4 Re-apply the terminal cover and fasten the screws.

Note

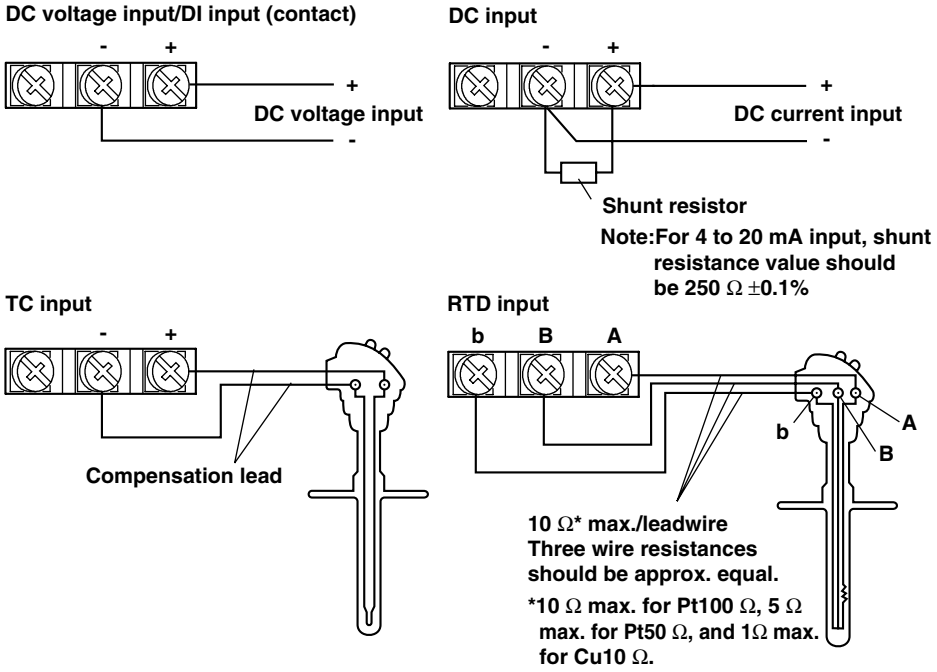
- Make sure that the equipment connected to the signal input/output conforms IEC (CSA) 950 or IEC (CSA) 1010. Also, make sure to use cables that conform to IEC (CSA) standards.
- In case you are using an internal RJC in case of thermocouple input, the following considerations are necessary to stabilize the temperature at the terminals. Always make sure to re-apply the terminal cover; The thermal capacity of the wiring should be small (cross sectional area of less than 0.5 mm^2); Minimize outside temperature fluctuations as much as possible.
- To prevent noise, make sure to ground each unit at the function grounding terminal (below the power switch) together at one point.
- Refrain from wiring the input signals parallel. However, if you do, then the following considerations are necessary. Ground all equipment at the same point; Do not turn the power of other equipment ON/OFF during operation; Do not use the burnout function.
- If communication is disrupted while outputting the value of the communication input channel from the retransmission module, the retransmission module holds the value that was output immediately before the disruption occurred.
- After the power is turned ON or the retransmission or input channel settings are changed, it may take apporoximately twice teh measurement interval (amount of time needed to make two measurements) for the value of the retransmission to be stabilized.
- When a computation error or a burnout occurs, the output voltage or current will be the "+OVER" level or the "-OVER" level depending on the Set Up mode settings.
- The maximum time that takes to search out a burnout by using the universal input module or the DCV/TC/DI input module is 2.5 seconds. The values being output during this period from the transmission output module are unstable if a burnout occurs.

Wiring Input Signal Lines (to Universal , DCV/TC/DI and Digital input modules)

Terminals

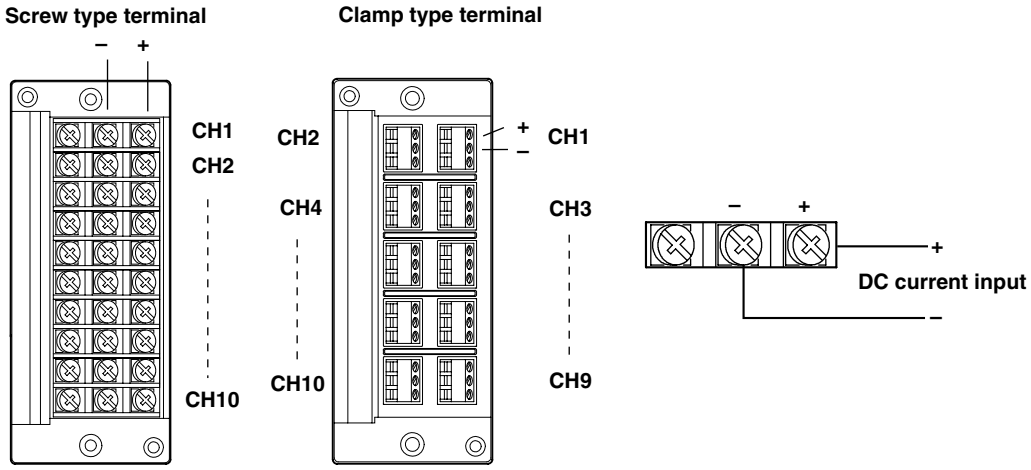


Wiring Diagrams



Wiring DC Current Input Signal Lines (mA-input Module)

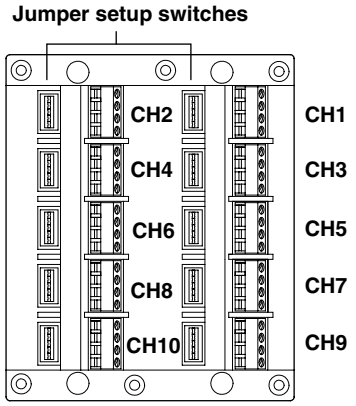
Diagrams of Terminal Blocks and Wiring



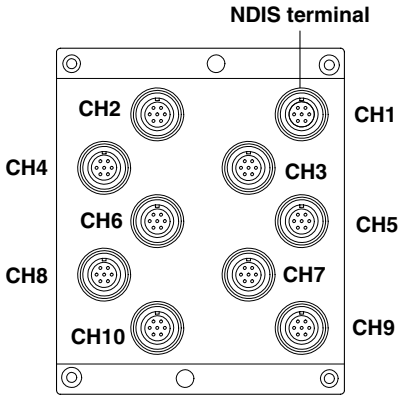
Wiring Strain Input Signal Lines (to Strain Input Module)

Diagrams of Terminal Blocks

Model with Built-in Bridge Resistors

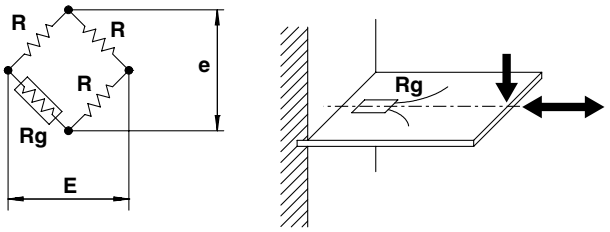


Model with External Bridge Resistors



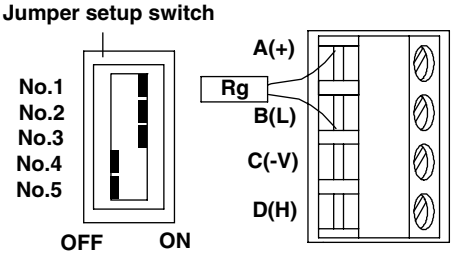
Wiring Diagrams

- **Single-gauge method**



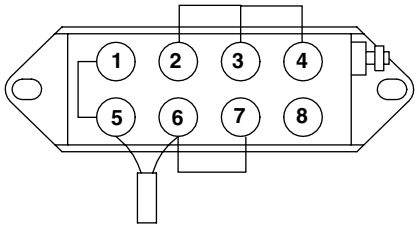
R = fixed resistor
r = resistance of leadwire
Rg = resistance of strain gauge
e = output voltage developed across bridge
E = voltage imposed across bridge

DU500-12/DU500-13
Jumper setup switch

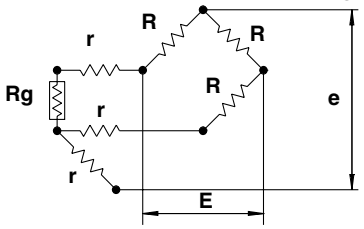


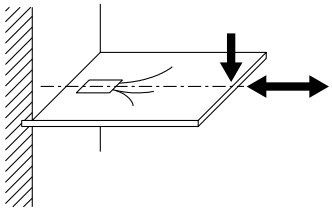
No.1	No.2	No.3	No.4	No.5
ON	ON	ON	OFF	OFF

DU500-14



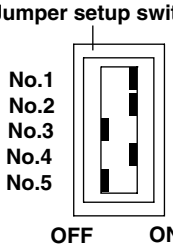
• **Single-gauge three-wire method**

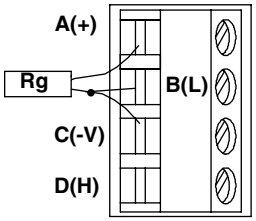




R = fixed resistor
r = resistance of leadwire
Rg = resistance of strain gauge
e = output voltage developed across bridge
E = voltage imposed across bridge

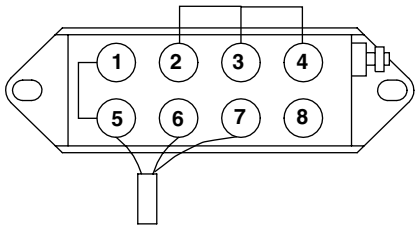
DU500-12/DU500-13
Jumper setup switch



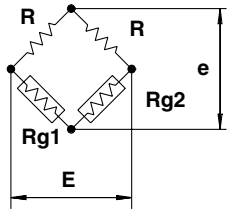


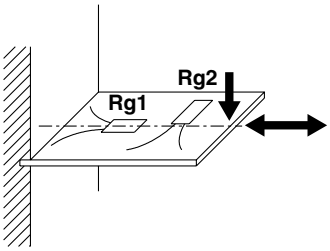
No.1	No.2	No.3	No.4	No.5
ON	ON	OFF	ON	OFF

DU500-14



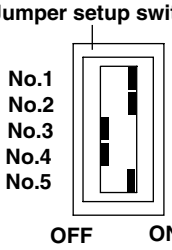
• **Adjacent-side two-gauge method**

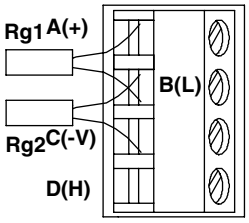




R = fixed resistor
r = resistance of leadwire
Rg = resistance of strain gauge
e = output voltage developed across bridge
E = voltage imposed across bridge

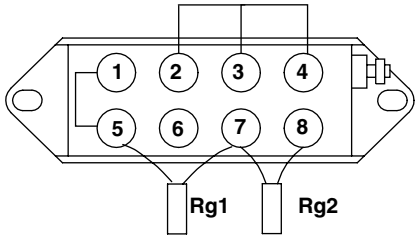
DU500-12/DU500-13
Jumper setup switch



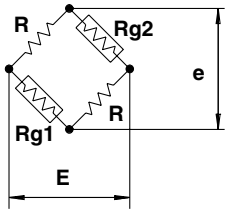


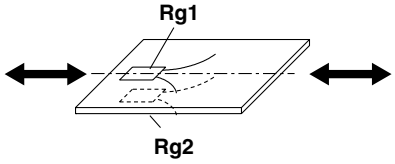
No.1	No.2	No.3	No.4	No.5
ON	ON	OFF	OFF	ON

DU500-14



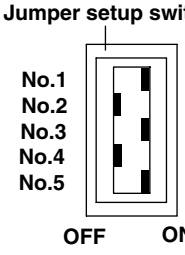
• **Opposed-side two-gauge method**

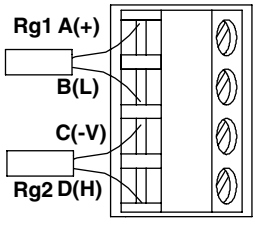




R = fixed resistor
r = resistance of leadwire
Rg = resistance of strain gauge
e = output voltage developed across bridge
E = voltage imposed across bridge

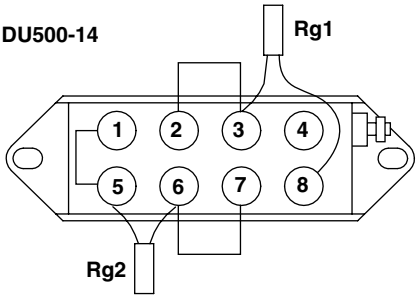
DU500-12/DU500-13
Jumper setup switch



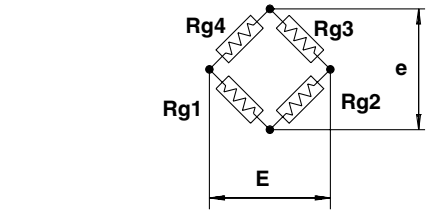


No.1	No.2	No.3	No.4	No.5
ON	OFF	ON	OFF	ON

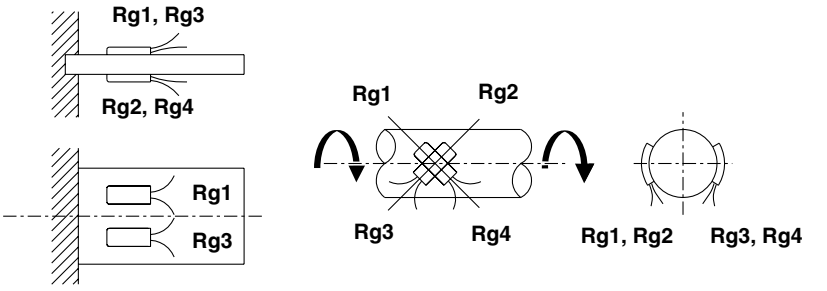
DU500-14



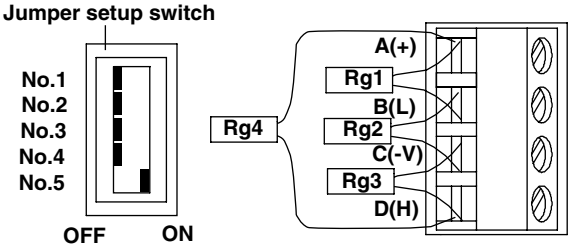
• **Four-gauge method**



R = fixed resistor
r = resistance of leadwire
Rg = resistance of strain gauge
e = output voltage developed across bridge
E = voltage imposed across bridge

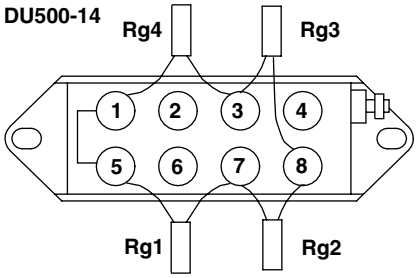


DU500-12/DU500-13
Jumper setup switch



No.1	No.2	No.3	No.4	No.5
OFF	OFF	OFF	OFF	ON

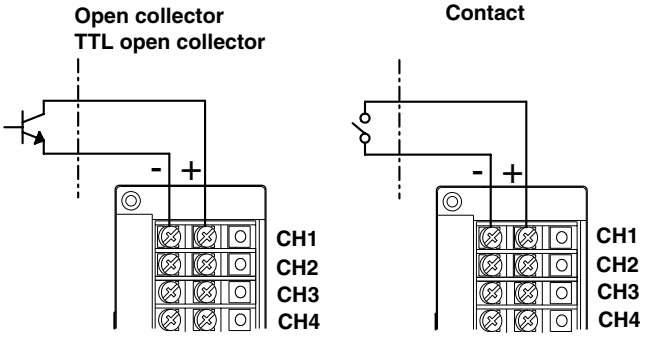
DU500-14



Note

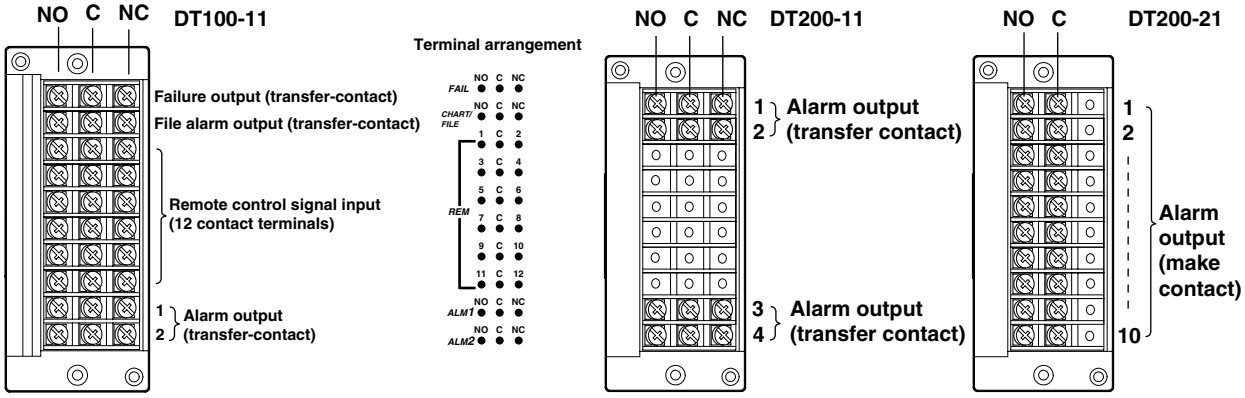
Please apply the optional DV450-001 strain conversion cable when using a bridge box or strain gage without sensor line.

Wiring Pulse Input Signal Lines (to Pulse Input Module)



Wiring Output Signal and Remote Control Signal Lines (to DI/DO and Alarm modules)

Terminals



Output contact capcacity: 250 V DC/0.1 A (resistive load), 250 V AC/2A (resistive load), 30 V DC/2A (resistive load)

Connecting the Retransmission Signal Lines (Retransmission Module)

Processing of Faulty Data

You cam set the output value that corresponds to abnormal measured balues, computed values, and communication input value using the dip switch of the retransmission module.

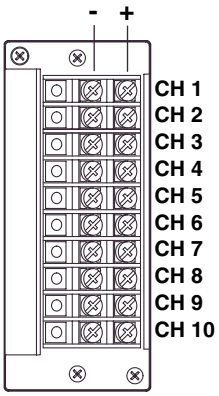
Output Type	Output Value	SW1	SW2	SW3
Approx. 0 V (0.05 V or less) or approx. 0 mV (0.15 mA or less)	ZERO	OFF	OFF	-
-5% (0.8 V or 3.2 mA)	-OVER	ON	OFF	-
+110% (5.4 V or 21.6 mA)	+OVER	OFF	ON	-
Value immediately before the faulty data occurence	Previous value	ON	ON	-

Data are processed as faulty data in the following cases:

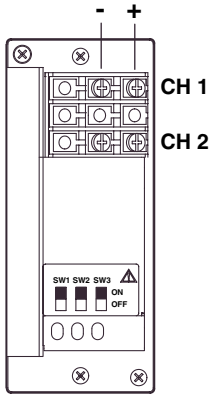
- When the power of the expanded model main unit switches OFF.
- When the measurement channel that is retransmitting experiences the following:
  The module of the corresponding measurement channel is removed from the unit.
  The power of the unit to which the corresponding channel is connected is removed.

Terminals

DT500-11



DT500-21



Wiring AC Input Signal Lines (Power Monitor Module)

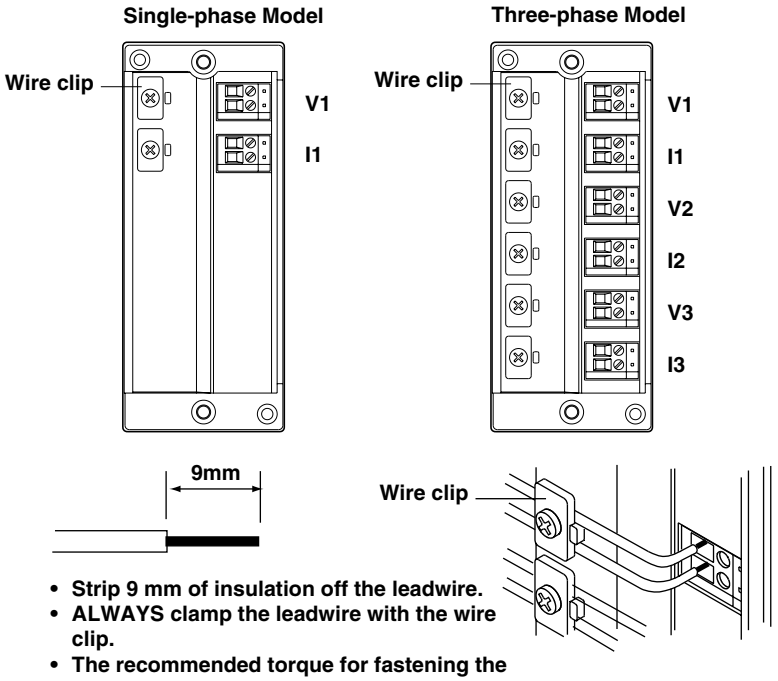
WARNING

- For hazard prevention, ALWAYS provide protective grounding before connecting measuring leadwires.
- When connecting any object being measured, ALWAYS turn off the power to the object. It is extremely dangerous to connect or disconnect interconnecting leadwires with the power to the object left on.
- Exercise utmost care to avoid connecting any current-mode circuit to a voltage-input terminal or any voltage-mode circuit to a current-input terminal. Wrong connection may result in damage to the circuit or equipment being measured or the DC100 itself, as well as bodily injury.
- Fuses are not built into voltage- and current-input terminals. ALWAYS install a fuse on the interconnecting leadwire. Use a fuse that will not permit the voltage or current being measured to exceed the maximum ratings of an AC input module.
  The maximum voltage and current that can continuously be imposed on an AC input module are as follows:
  Voltage: 250 V rms; current: 5 A rms
- To avoid electrical shock, ALWAYS attach the terminal cover in place after the completion of wiring to the terminals so that the terminals cannot be accidentally touched.

CAUTION

- In wiring, use double-insulated leadwires that have sufficient withstanding-voltage and current-carrying-capacity margins against the voltage and current being measured and meet the ratings at which they are used.
- ALWAYS clamp measuring leadwires with the wire clips to prevent the wires from being disconnected from their terminals. As the measuring leadwires, use wires 0.2 to 2.5 mm^2 (AWG14 to 25) thick so they can be fastened securely with the wire clips.
- The power monitor module is a product belonging to Installation (Over-voltage) Category CAT II.

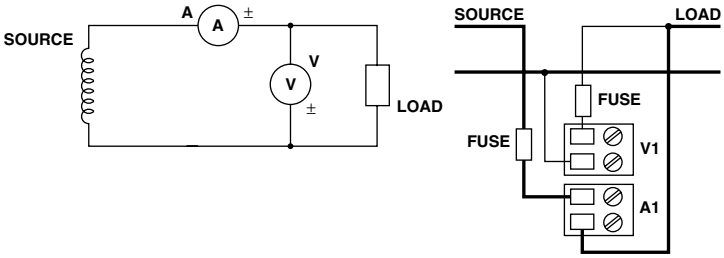
Diagrams of Terminal Blocks



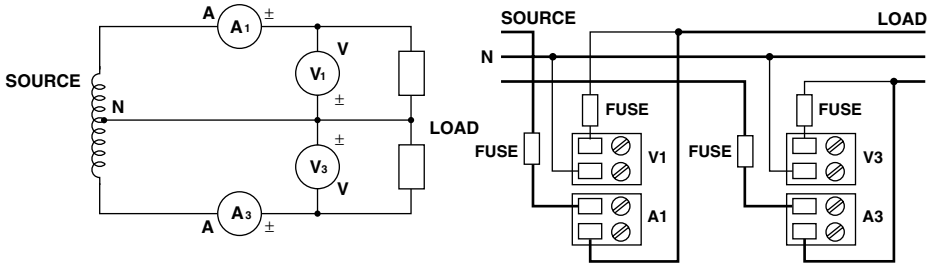
- **Strip 9 mm of insulation off the leadwire.**
- **ALWAYS clamp the leadwire with the wire clip.**
- **The recommended torque for fastening the wire clip screw is 0.4 to 0.5 N•m.**

Wiring Diagrams

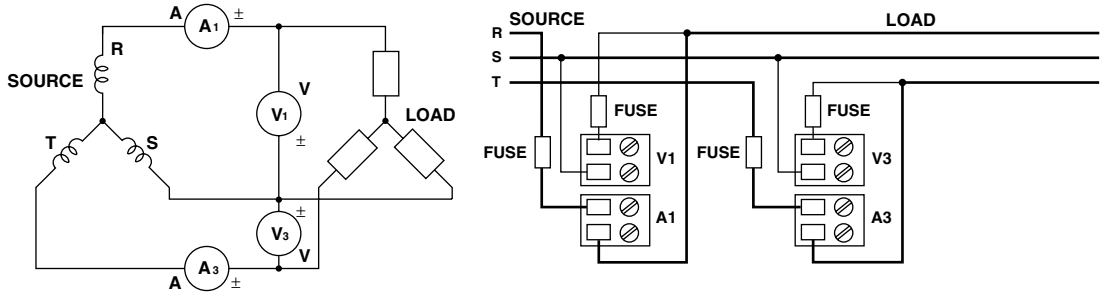
- **Single-phase Two-wire Configuration**



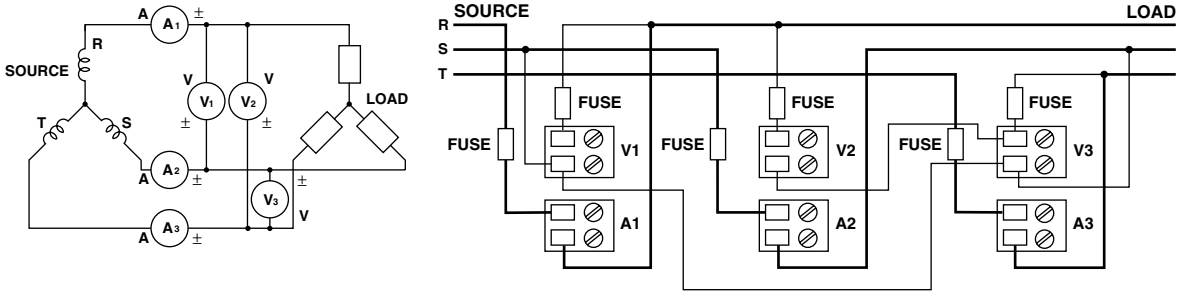
- **Single-phase Three-wire Configuration (power monitor modules for three-phase use only)**



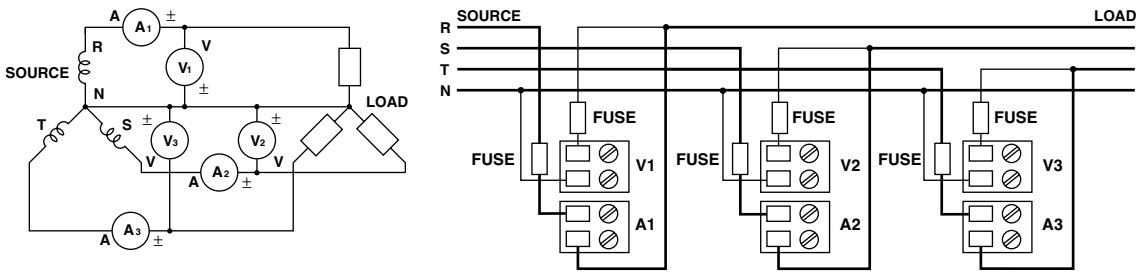
- **Three-phase Three-wire Configuration (dual-current/dual-voltage measurement; power monitor modules for three-phase use only)**



- **Three-phase Three-wire Configuration (triple-current/triple-voltage measurement; power monitor modules for three-phase use only)**



- **Three-phase Four-wire Configuration (power monitor modules for three-phase use only)**



3.7 Connecting an Extension Module to Extension Bases

Using an extension module and extension bases, you can install input modules at a location distant from the subunit (s). The module and bases are powered from the subunit and, therefore, can be located even in a place where there is no power source nearby.

Installing an Extension Base

WARNING

- For fire prevention, use extension bases in an upright position. Do not cover up the extension base's module (allow a clearance of at least 3 cm around the module).
- To prevent electric shock, connect an extension base after checking that the power switch of the subunit is turned off.

Ambient Temperature and Humidity

Use an extension base under the following environmental conditions:

- Ambient temperature: –10˚ to 60˚C
- Ambient humidity: 20 to 80% RH at -10˚ to 40˚C
  10 to 50% RH at 40˚ to 50˚C
  5 to 30% RH at 50˚ to 60˚C
  Use the extension base in a condensation-free condition.

Note

Condensation may occur if you move the extension base from an area of low humidity to an area of high humidity or if any drastic temperature variation takes place. In addition, a measurement error will result if the instrument is in the thermocouple input mode. In that case, allow at least one hour for the extension base to adjust to the ambient atmosphere before using it.

Do not install the extension base where:

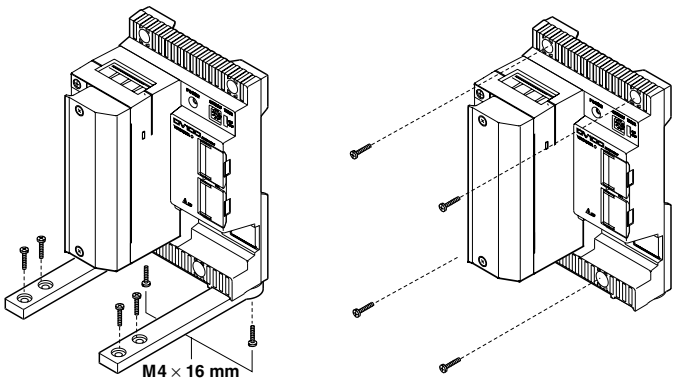
- it is exposed to direct sunlight or there is a heat source nearby;
- soot, steam, dust and/or corrosive gas is relatively abundant;
- there is a strong electromagnetic source nearby;
- there is high-voltage equipment or a power line nearby;
- it is exposed to severe and/or frequent mechanical vibration; or
- it is not positioned stably.

Desk-top or Floor Installation

Attach the two supplied shoe plates onto the extension base with two screws (4-mm screws 16 mm long, supplied as standard accessories), as shown in the figure on the left below. Then, place the extension base in an upright position. If the base is liable to fall on its side after wiring, fix the shoe plates with the four supplied screws (4-mm screws 12 mm long) using the through-holes (for 4-mm screws) of the shoe plates.

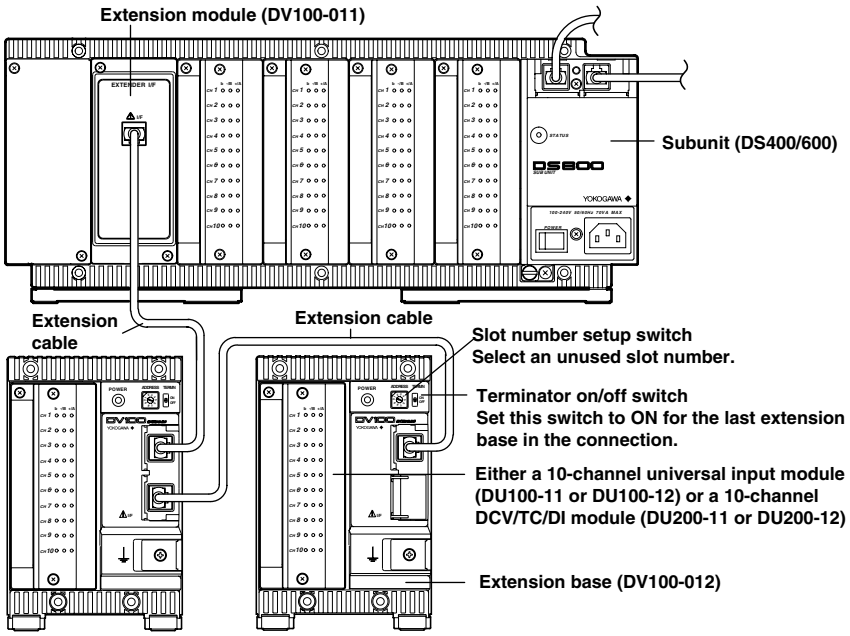
Direct Mounting on Panel

According to the figure on the right below, fix the extension base onto a panel by fastening the four corners with the supplied screws (4-mm screws 12 mm long).



Connecting Extension Bases to an Extension Module

Mount the extension module onto the subunit. The module cannot be mounted to the instrument itself. Wire the extension module to the extension base with an extension cable. You can wire a maximum of three extension bases to one extension module at the same time. It is not possible, however, to wire extension bases in such a manner that the total sum of modules already mounted on the subunit and the extension bases being wired exceeds the maximum number of modules (four for the DS400 subunit and six for the DS600 subunit) allowed for mounting on the subunit. Either a 10-channel universal input module (DU100-11 or DU100-12) or a 10-channel DCV/TC/DI module (DU200-11 or DU200-12) can be mounted onto each extension base.



Note

Make sure the subunit power is turned off before connecting to the extension module and extension bases, as the DC100 cannot recognize the module when the power is left on. If you connect while the power is still on, turning the subunit power off and then on again will enable the DC100 to recognize the module.

Wiring Distance

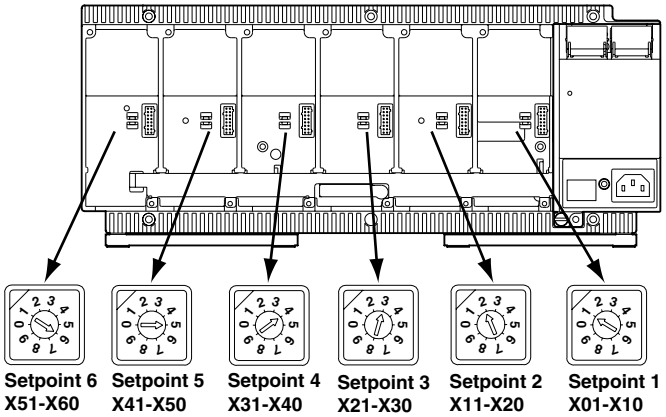
The last extension base in the connection can be located at a maximum distance of 30 m from the subunit.

Setting of Terminator On/Off Switch

Set the terminator on/off switch of an extension base to ON for the base that is the last in the connection. Set these switches of all other extension modules to OFF.

Setting of Slot Numbers

Select an unused slot number for each extension base. This can include, however, a slot number for an extension module. The following figure shows how the numbers you set correspond to the positions of slots and relate to channel numbers.



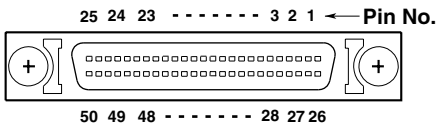
3.8 Connecting SCSI Devices

SCSI Specification (Option)

Item	Specification
Interface Standard	SCSI (Small Computer System Interface), Conforms to ANSI X3.131-1986
Connector type	50-pin half-pitch type
Electrical Specification	Single-ended. See table below for pin assignments. Built-in terminator.

Pin No.	Pin Signal
1 to 12	GND
13	NC
14 to 25	GND
26	-DB0
27	-DB1
28	-DB2
29	-DB3
30	-DB4
31	-DB5
32	-DB6
33	-DB7
34	-DBP
35 to 37	GND

Pin No.	Pin Signal
38	TERMPWR
39, 40	GND
41	-ATN
42	GND
43	-BSY
44	-ACK
45	-RST
46	-MSG
47	-SEL
48	-C/D
49	-REQ
50	-I/O



Items needed for connection

Connection cable

Use a commercially-sold cable with a ferrite core on each end with a characteristic impedance of 90 to 132Ω.

Connecting procedure

1. Connect the SCSI cable to the SCSI connector on the back panel.
2. Turn on the power switch of the SCSI device and the DC100. Make sure to turn on the SCSI device before turning on the DC100. To format the disk, follow the instructions on Section 11.6, “Formatting a Disk.”

Recommended SCSI devices

MO Drive (3.5 inch)
3. 5-inch MO drives that connect to SCSI can be used.
You can read and write to a medium conforming to the ISO format (up to 640 MB).
HS drives are not supported.
Recommended MO drives: 640MO TURBO (made by Olympus)
Mocking Bird MO640 (made by Fujitsu)

ZIP Drive
ZIP drives that connect to SCSI can be used.
Recommended ZIP drive: Iomegazip (made by Iomega)

PD Drive
PD drives that connect to SCSI can be used.
Recommended PD drive: Panasonic LF-1600JP (made by Panasonic)

Using the devices

CAUTION

Never remove the disk while the SCSI device is being accessed. It may damage the SCSI device or destroy the data on the disk.

- Use OS, device driver, and interface card that support semi-IBM format.
  Contact the provider or manufacture to find out whether your OS, device driver, and interface card support the semi-IBM format.
- Do not connect a personal computer to the SCSI chain as it may cause the DC100 to operate improperly.

Note

- When connecting multiple SCSI devices in a chain, attach a terminator to the device at the end of the chain. Keep the total length of the SCSI chain to 6 m or less.
- SCSI devices that are turned off will not be detected.
  To detect the device, turn it on and then perform manual detection according to Section 11.7, "Detecting MO/ZIP/PD Disk Drive."
- Connect the SCSI cable securely. Otherwise, the operation becomes unstable, and can cause operation errors (error message numbers 120, 121, 131, 135). If these errors occur, turn OFF the SCSI device and connect the SCSI cable securely. Then, check that the SCSI device information is displayed by following the steps described in section 11.5 "Displaying Floppy Disk Information." Also, do a disk check on the personal computer, because sometimes the disk becomes corrupt.
- Make sure to set or attach a terminator to the furthest SCSI device from the DC100. Otherwise, the operation becomes unstable, and can cause operation errors (error message numbers 120, 121, 131, 135). If these errors occur, turn OFF the SCSI device and set or attach the terminator. Then, check that the SCSI device information is displayed by following the steps described in section 11.5 "Displaying Floppy Disk Information." Also, do a disk check on the personal computer, because sometimes the disk becomes corrupt.
- Do not turn OFF the SCSI device, remove the disk, or disconnect the SCSI cable while the SCSI device is being accessed. If you accidentally do so, turn OFF the SCSI device and check that the SCSI device information is displayed by following the steps described in section 11.5 "Displaying Floppy Disk Information." Also, do a disk check on the personal computer, because sometimes the disk becomes corrupt.
- If there are more than 1000 files on the SCSI device, copying files takes time. In addition, copying of files sometimes fail if you are copying with the event/action function.
- Because the SCSI device is a data storing device for the computer, noise countermeasure may not be adequate. Be careful of the environment in using the SCSI device. If noise is a problem, take the following measures to reduce the noise.
  Attach a clamp filter (ZCAT3035-1330 by TDK) to the SCSI cable.
  Insert a filter or an insulation transformer at the power supply of the SCSI device.
  For details, see section 3.12 "Countering Noise."

3.9 Connecting the Power Cord and Turning the Power ON/OFF

When Using the Accessory Power Cord

DC100/DS400/DS600 (when using the accessory power cord)

Follow the warnings below to avoid electric shock or damaging the instrument.

WARNING

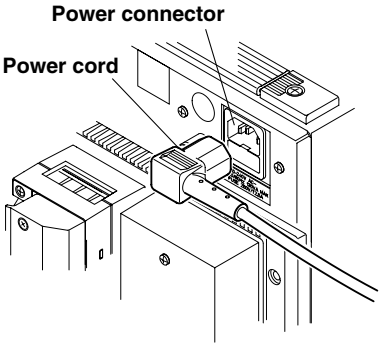
- Connect the power cord only after confirming that the voltage of the power supply matches the rated electric power voltage for this instrument.
- Connect the power cord after checking that the power switch of this instrument is turned off.
- To prevent electric shock or fire, always use the power cord supplied by Yokogawa.
- Always use protective grounding to prevent electric shock. Connect the power cord of the instrument to a three-pole power outlet which has a protective ground terminal.
  Do not use the function grounding (⏚ marked terminal) under the power connecting part as the protective grounding terminal.
- Never use an extension cord that does not have protective grounding, otherwise the protection feature will be negated.
- When unplugging the power cord, do not pull on the power cord. Always hold the plug. If the power cord becomes damaged, contact your nearest representative listed on the back covere of this manual.

Connecting Procedure

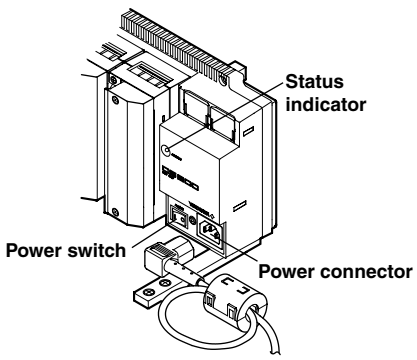
1. Check that the power switch is turned off.
2. Connect the plug of the accessory power cord to the power connector.
3. Plug the other end of the power cord into a power outlet that satisfies the following conditions:
   For the DS400/DS600 in order to cut down on unnecessary radio interference, attach a clamp filter (accessory) near the power cord plug as shown below. Make a loop with the power cord and clamp it in the clamp filter.
   Rated supply voltage : 100 to 240 V AC (free power supply),operating voltage: 90 to 250 V AC
   Rated supply voltage frequency : 50/60 Hz
   Power consumption : DC100 stand-alone model ..... About 90 VA max.
   DC100 expandable model ..... About 90 VA max.
   DS400 ..... About 55 VA max.
   DS600 ..... About 70 VA max.

Use a three-pole power outlet provided with a protective ground terminal.

• DC100



• DS400/DS600



When Using an Adapter for Direct Wiring to the Power Supply

DC100/DS400/DS600 (when connecting wires to screw terminals)

This applies only to products with power inlet W suffix code.
Follow the warnings below to avoid electric shock or damaging the instrument.

WARNING

- Connect the power wires after checking that the power supply is turned off to prevent electric shock.
- To prevent fire, use 600 V PVC insulated wire (AWG18) for both power and ground wiring (cross section of 0.83 mm^2 or thicker, anti-galvanic corrosion finish, insulation thickness more than 0.8 mm, insulation resistance more than 50 MΩ/km at 20°C, approved EN60 320 (VDE0625)), or equivalent cables.
- Units equipped with screw type terminals should only be used in panel installations.
- Before turning on the power, always ground the protective ground terminal. Do not use the function grounding terminal (⏚ marked terminal) under the power connecting part as the protective grounding terminal.
- For AC power and ground wiring, use “crimp on” lugs (for 4-mm screws) with insulation sleeves. Make sure that the crimp-on tool must be one specified by the crimp-on lugs manufacture, and that the crimp-on lugs and tool must be matched to the wire size.
- To prevent electric shock, do not touch the terminals after wiring.
- Make sure to apply a power switch in the power supply cord with the following characteristics:
  rated power current ≥ 3 A
  rated ruch current ≥ 90 A

Connecting procedure (DC100)

1. Check that the power switch is turned off.
2. Remove the cover protecting the power terminals.
3. Connect the power supply wires and the protective ground wire to the power terminals.
4. Replace the cover.

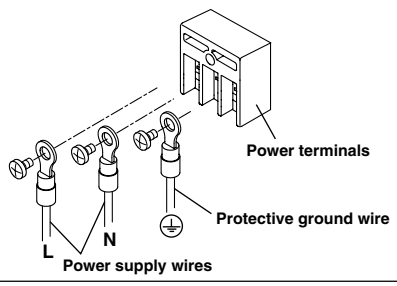
Connecting procedure (DS400/DS600)

1. Check that the power switch is turned off.
2. Remove the cover protecting the power terminals.
3. Connect the power supply wires and the protective ground wire to the power terminals.
4. Replace the cover.

   For the DS400/DS600 in order to cut down on unnecessary radio interference, attach a clamp filter (accessory) near the power cord plug as shown below. Make a loop with the power cord and clamp it in the clamp filter.

   Rated supply voltage : 100 to 240 V AC (free power supply),operating voltage: 90 to 250 V AC
   Rated supply voltage frequency : 50/60 Hz
   Power consumption : DC100 ... About 90 VA max.
   DS400 ... See previous page.
   DS600 ... See previous page.

- **DC100/DS400/DS600**



DC100/DS400/DS600(when using DC power supply connecter)

This applies only to products with power supply 2 suffix code.

Follow the warnings below to avoid electric shock or damaging the instrument.

WARNING

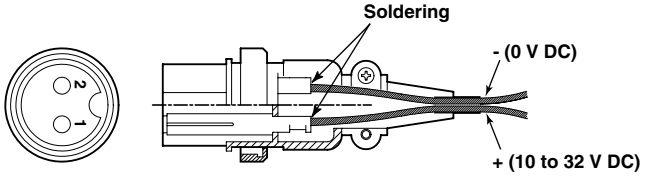
- Connect the power wires after checking that the power supply is turned off to prevent electric shock.
- To prevent fire, use wires with cross sectional area of 0.3mm^2(22AWG) or more.

CAUTION

- If you connect the + and - terminals in reverse on the DS400/DS600, the internal fuse will be blown (You cannot replace the fuse by yourself. The instrument needs servicing in this case). If there is a possibility of reversing the polarity, insert a fuse (rating shown below) in the wiring. This will lower the chances of blowing the internal fuse.
  Fuse: 250 V/T2.5 A to T4A (time lag), 20 mm glass tube fuse,
  I^2t = 12.5 to 32
  (Recommended: A1350EF (250 V/T2.5 A, I^2t=12.5: SCHURTER: FST0034.3121))

Connecting procedure

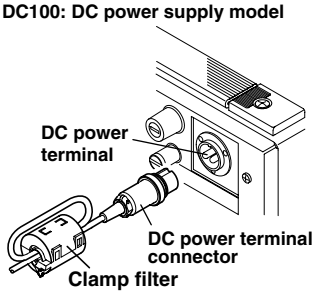
1. Check thst the power switch is turned off.
2. Connect the accessory DC power terminal connector (part No. A1105JC) to the power wire and the DC100/DS400/DS600. Use a power wire with a cross sectional area of 0.3 mm^2 (22AWG) or more.
   Install the clamp filter (standard accessory) near DC100 of power wire.



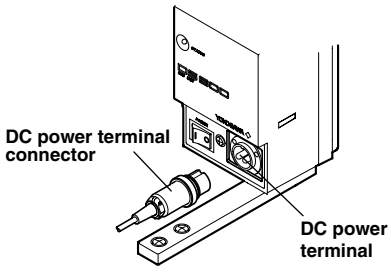
DC100
Rated supply voltage: 12 to 28 V DC
Operating supply voltage: 10 to 32 V DC
Power consumption: About 30 VA max.

DS400/DS600
Rated supply voltage: 12 to 28 V DC
Operating supply voltage: 10 to 32 V DC
Power consumption: About 25 VA max.

• DC100: DC power supply model



• DS400/DS600: DC power supply model



DC100/DS400/DS600(when using AC adapter)

This applies only to products with power supply 2 suffix code.

Follow the warnings below to avoid electric shock or damaging the instrument.

WARNING

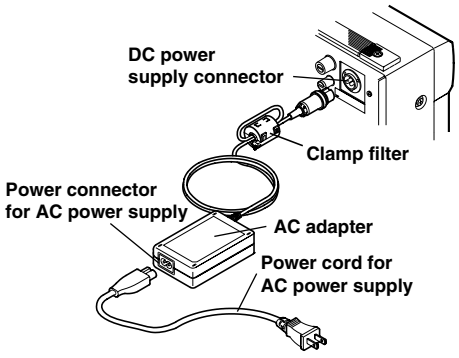
- Connect the power wires after checking that the power supply is turned off to prevent electric shock.
- To prevent electric shock or fire, always use the power cable supplied by YOKOGAWA.
- Before connecting the power cord, check that the voltage on the supply side matches with the voltage rating of this recorder.
- When not using the instrument for a long time, unplug the power cord of the AC adapter.
- Only use the AC adapter from YOKOGAWA (Model No.: DV500-00x).
- Do not put objects on top of the AC adapter or the power cord. Also, do not let heat generating objects come in contact with them.
- When unplugging the power cord, do not pull on the power cord. Always hold the plug. If the power cord becomes damaged, contact your nearest representative listed on the back cover of this manual.

Connecting Procedure

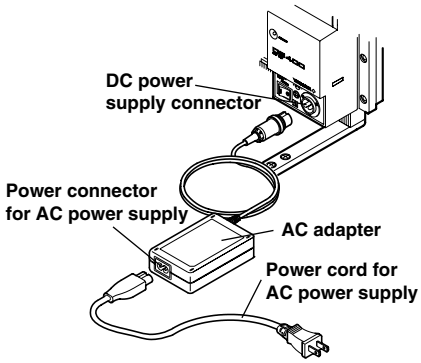
1. Check that the power switch is turned OFF.
2. Connect the AC adapter to the AC adapter jack on DC100.
   Install the clamp filter (standard accessory) near DC100 of power cord.
3. Connect the power cord plug that came with the AC adapter to the power supply connector of the AC adapter.
4. Connect the plug on the other end of the power cord to a power outlet meeting the following specifications.
   The power outlet should be a three-pole type with a protective grounding terminal.

Rated power supply voltage: 100 to 240 VAC
Operating supply voltage range: 90 to 250 VAC
Rated supply voltage frequency: 50/60 Hz
Maximum power consumption: 90 VA
AC adapter rated output voltage: 12 VDC
AC adapter maximum rated output current: 2.6 A

• DC100



• DS400/DS600



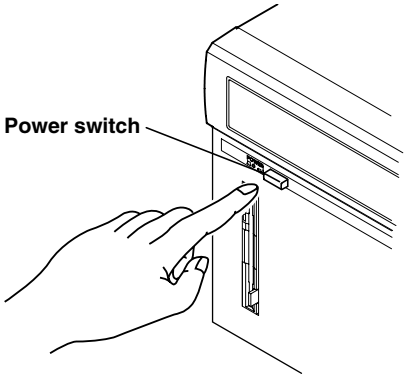
Functional grounding

When using the AC adapter, noise may be reduced if the functional ground is connected to the earth GND. Use the functional ground terminal as necessary.

Switching the Power ON/OFF

DC100

The power switch is a push-button; the power is turned on when pressed once and turned off when pressed again.



Note

- Before turning the power on, check that each unit is properly mounted and the power cord is correctly connected.
- If nothing appears on the display when the power switch is turned on, turn off the power and check the following:
  - Is the power cord properly connected?
  - Is the supply voltage within the range noted on the previous page?
  - Is the power fuse blown (see page 13-2)
    If the problem still cannot be fixed, there may be an equipment problem; please contact your nearest sales representative. Addresses may be found on the back cover of the manual.
- The device takes about 30 minutes to warm up.
- The service life of the lithium battery used to save the settings is about 10 years at an ambient temperature of 23°C. If the settings cannot be held because the lithium battery has run down, please contact your nearest sales representative. Addresses may be found on the back cover of the manual.

DS400/DS600

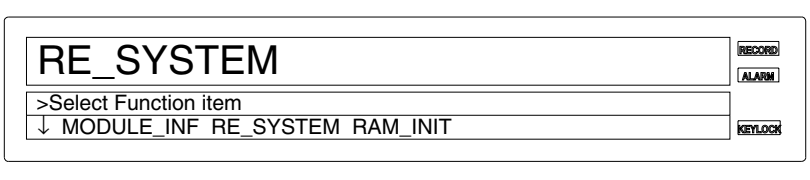
When the "|" side of the power switch is pressed, the power is turned on and when the "O" side of the switch is pressed, the power is turned off. When the power is turned on, the status indicator (see the figure on page 3-27) lights.

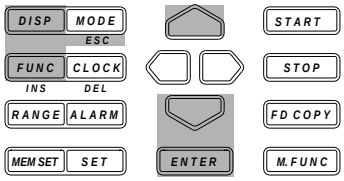
Note

- Before turning the power on, check that each unit is properly mounted and the power cord is correctly connected.
- If the status indicator does not go on when the power switch is turned on, turn off the power and check the following:
  - Is the power cord properly connected?
  - Is the supply voltage within the range noted on the previous page?
    If the problem still cannot be fixed, there may be an equipment problem; please contact your nearest sales representative. Addresses may be found on the back cover of the manual.
- If the status lamp flashes, it means that there is an internal error. Turn off the power switch and check the same items as for the DC100. If the problem still cannot be fixed, there may be an equipment problem; please contact your nearest sales representative. Addresses may be found on the back cover of the manual.
- If the power of a subunit is turned on and off with multiple subunits connected, subunits connected subsequently to the end from the subunit whose power is turned off will not be recognized temporarily.
- The device takes about 30 minutes to warm up.

3.10 Structuring System Modules

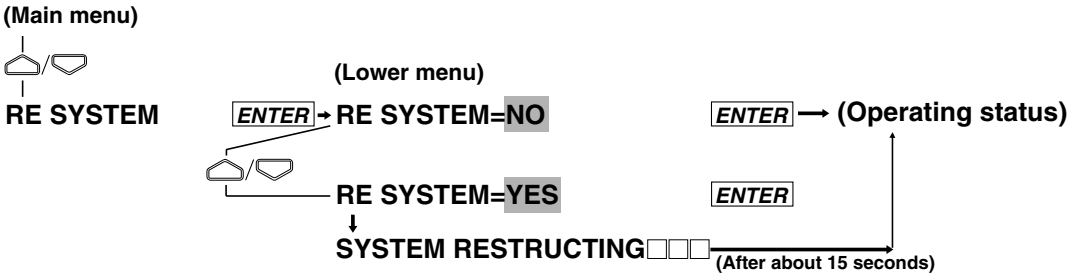
Relevant Keys





Operating Procedure

- Press and hold the FUNC key for about three seconds to enter the FUNC3 menu.
- To enter the FUNC menu from the [RANGE], [ALARM], [MEM SET], or [SET] (SET3) menu, press the DISP key.
- Select/set ▭ using the ▲▼ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.



Explanation

System configuration (RE SYSTEM)

When you use this instrument for the first time after its purchase or if the system has been changed, system structuring is necessary. Each module is recognized as a system of this instrument after the system configuration.

- NO: Modules are not recognized as system modules.
- YES: Modules are recognized as system modules. It takes about 15 seconds to recognize system modules.

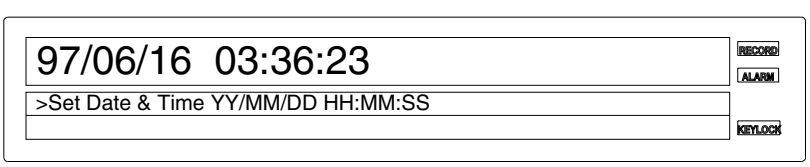
System configuration is executed by pressing the ENTER key. After that, the instrument returns to the operation mode.

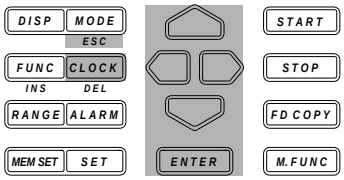
Note

- After completing the system configuration, if you attempt to do the following, and then configure the system again, the setting information for the corresponding module position (slot) will be initialized.
  - Install modules with different model codes/style numbers into slots.
  - Remove modules.
  - Add modules.
- When you attempt the following, you should first configure the DC100 system to operate the instrument correctly. After executing the system configuration, check the module information.
  - Subunit connections (including additions and replacement)/removal/unit-number setting
  - Installation (including additions and replacement)/removal of modules
- If the installed modules are not recognized in the system configuration, check that the:
  - same unit number is not used or that the setting is out of range (see page 3-6),
  - number of modules does not exceed the allowed number (see page 3-6),
  - modules and units are connected properly, and
  - power supply is operating properly.

3.11 Setting the Date and Time

Relevant Keys





Operating Procedure

- Press the CLOCK key to display the CLOCK menu.
- Using the ⌃ and ⌄ keys changes numerals while using the < and > keys moves the digit.

97/06/16 03:36:23 ***ENTER***

>Set Date & Time YY/MM/DD HH:MM:SS

↓

***** SET OK*****

Explanation

Setting the Date and Time

Set them in the order of year/month/day, hour:minutes:seconds.

- Year: Specify the lower two digits of the year. Example: 1997 → 97, 2000 → 00
- Month, day: Use two digits for each.
- Hour: 00 to 23

Press the ENTER key at the set time to make it effective.

Note

The date and time settings are backed up by the lithium battery in the main unit.

3.12 Countering Noise

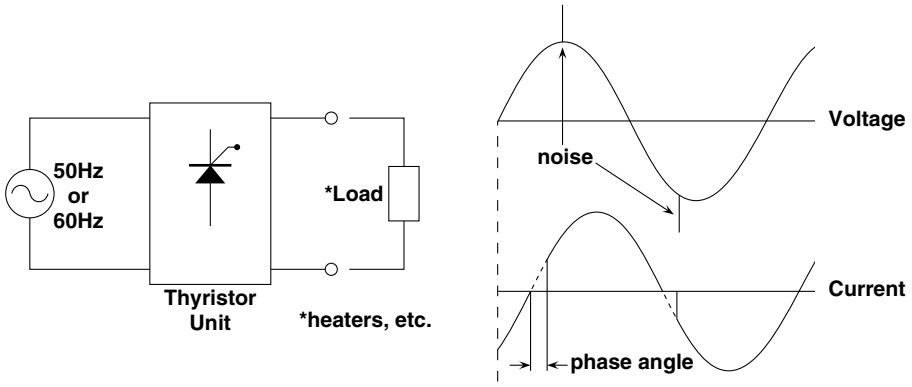
Types and Features of Noise Sources

Commercial Power Supply

It is necessary to consider both 50 and 60 Hz as noise components. It is important to note that a power supply line in which a thyristor or inverter is incorporated functions not only as an “energy supply line”, but also as a “noise source line.”

Thyristor (SCR)

A thyristor is used to control power through ON/OFF modulation of commercial power by controlling the phase angle.

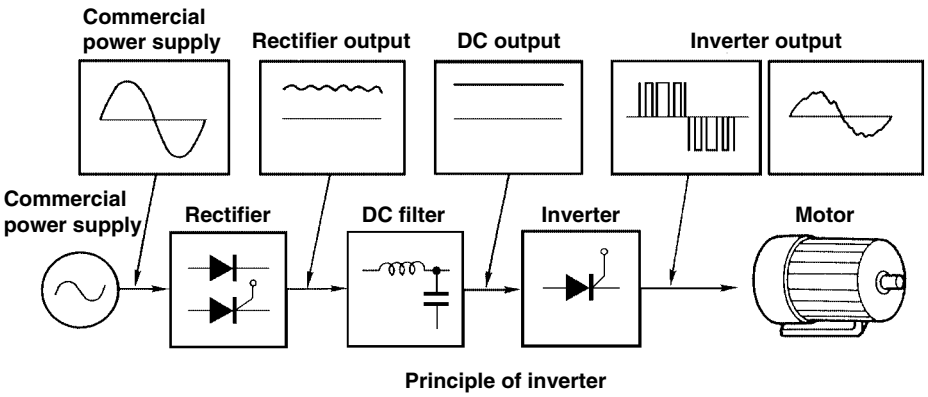


Thyristor waveform

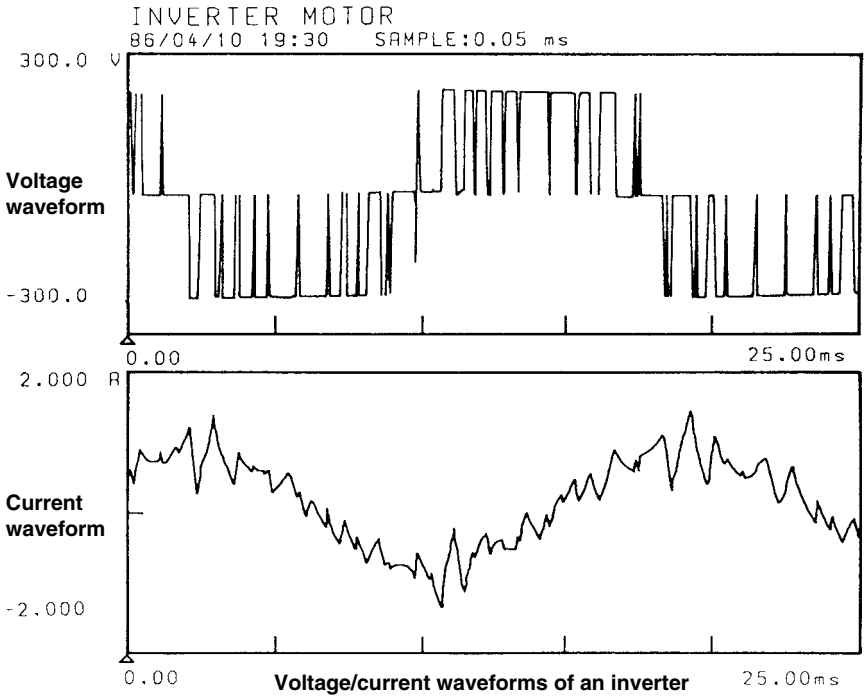
When the thyristor turns ON or OFF, a pulse noise is superimposed on commercial power supply, and its pulse width is approximately 1µs. Accordingly, thyristor noise can be defined as follows.
Thyristor noise = commercial power supply + pulse noise

Inverter

Commercial power supply is converted to direct current by a rectifier (sometimes the thyristor is used as the rectifier to stabilize direct current) and then modulated by a switching transistor and finally converted into alternating current at the desired frequency (from tens to hundreds of Hz) to drive a motor, for example. If the load to be driven is a fluorescent lamp, the frequency is tens of kHz. Accordingly, inverter noise can be defined as follows.
Inverter noise = commercial power supply + pulse noise (high density) + variable low frequency noise
Since the density of pulse noise is high compared to that of a thyristor and in addition, there is variable frequency noise, it is difficult to consider a countermeasure for inverter noise.



Principle of inverter



Voltage/current waveforms of an inverter

Relay

A relay is frequently used to amplify alarm and temperature controller outputs. However, since a counterelectromotive force (counter e.m.f.) is produced by coil inductance when the relay is turned off and the e.m.f. becomes noise, care must be taken. Due to chattering at the relay contact, tens to hundreds of kHz noise occurs mainly in bursts. Thus, the noise energy often becomes high.

Transceiver

In large-scale plants, transceivers are often used for communications between the field and the control room. Although W/G of the Japanese Electric Measuring Instruments Manufacturers Association recommends to use transceivers covering a wave band of 27 MHz, smaller-sized transceivers for the 140 or 470 MHz wave band are often used.

Noise Simulator

To test the immunity to pulse noise (mainly thyristor noise), a noise simulator is often used. A test noise of approximately 1 kV for 0.8 μs is used synchronously with the power supply frequency. Since data acquisition equipment is often used for measurements of equipment subjected to the pulse noise test, the influence of noise must be considered.

Propagation of Noise

• Noise is propagated in the following three ways.

Conduction: noise is conducted through a power line, input wiring, etc.
Electrostatic induction: noise leaks through capacitances between wires and instruments.
Electromagnetic induction: a loop in the input line, etc. induces an AC voltage by detecting the AC magnetic field.

In real applications, the above three propagation paths are not independent of each other. Their combination propagates noise to the equipment and causes problems.

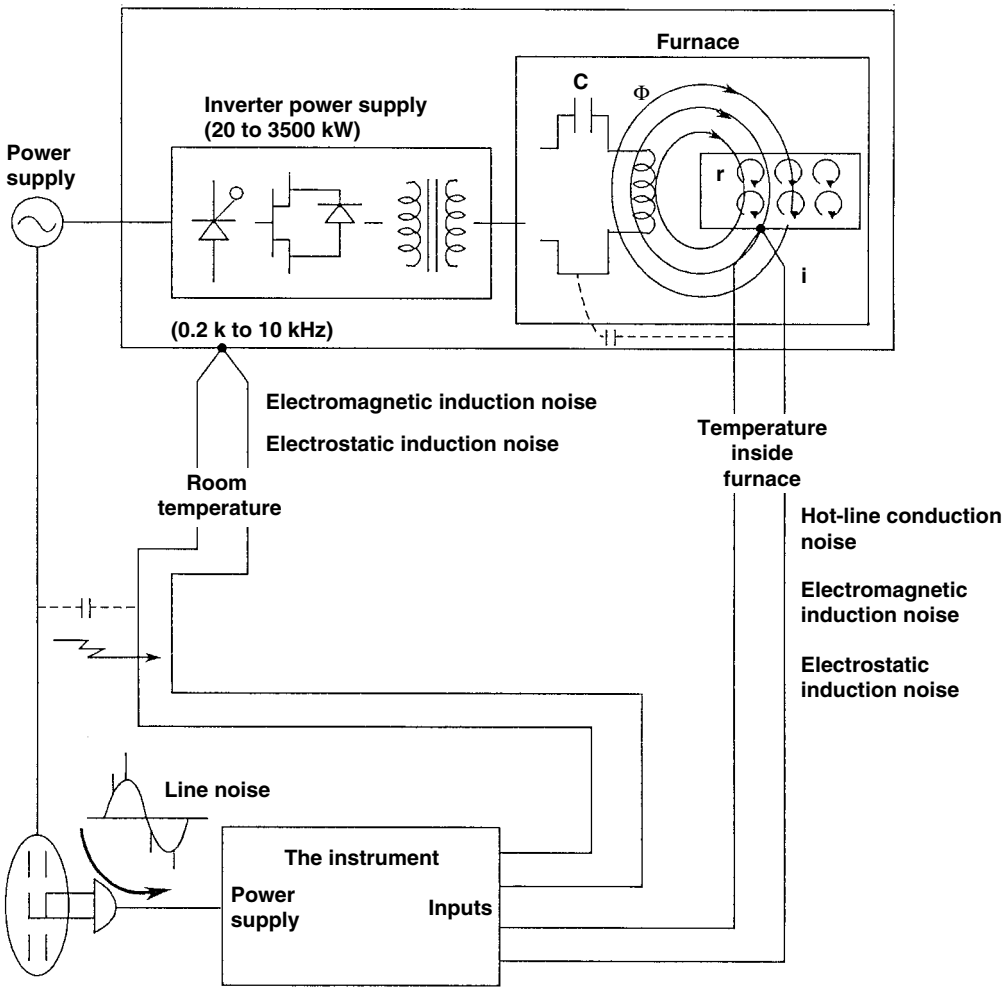
• Examples of noise propagated through each of these paths are given below.

Conduction: inverter noise, relay noise, thyristor noise, and noise caused by surface temperature measurement of a power transistor, etc.
Electrostatic induction: commercial power supply noise such as the hum of audio equipment, relay noise, etc.
Electromagnetic induction: leakage magnetic flux from a power transformer or motor, magnetic field from a high-frequency induction furnace, the rotating magnetic field of a power generator (Cu10 Ω), etc.

The figure on the next page shows the propagation paths using practical examples.

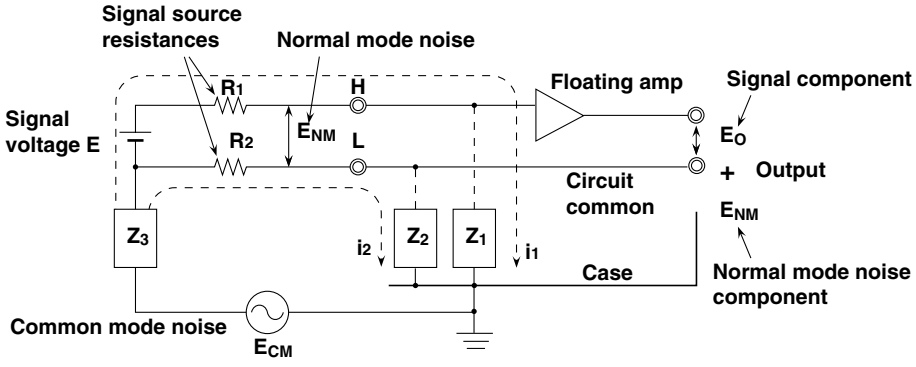
Example of a high-frequency induction furnace

* Due to electromagnetic induction, current i flows through the conductor, creating joule heat which heats the furnace.
$J=i^2r$



Basics of Anti-Noise Measures (part 1)

Common Mode Noise and Normal Mode Noise



Common Mode Noise (E_{CM})

Noise generated between the signal source and the ground of a measuring instrument. Since it is applied to both the H and L input terminals in phase with one another, it is also called in-phase voltage.

Normal Mode Noise (E_{NM})

This is an unfavorable noise that is superimposed on a signal voltage. Since it is a voltage between the H and L terminals, it is also called the line voltage, or since it is a voltage in series with the signal voltage, it is sometimes called the series mode voltage.

In the figure on the previous page, due to common mode voltage E_{CM}, noise currents i_1 and i_2 flow through the impedance to grounds Z_1 and Z_2 and coupling impedance Z_3, resulting in the generation of normal mode noise E_{NM} between input terminals H and L. Like this, common mode noise is converted to normal mode noise. The amp is equipped with a built-in filter and in case of output E_O the normal mode noise will be eliminated. This rate of conversion is called the common mode rejection ratio and expressed by the following equation.

- Common mode rejection ratio $\mathbf{(CMRR)=20Log\ \frac{E_O}{E_{CM}}(dB)}$

Since the actual CMRR is expressed using the ratio of an error component output caused by common mode noise to common mode noise, it contains the normal mode rejection ratio (NMRR) expressed by the following equation.

- Normal mode rejection ratio $\mathbf{(NMRR)=20Log\ \frac{E_O}{E_{NM}}(dB)}$

The NMRR is a value that shows the ability to reject the output error (normal mode noise component: E_{NM}) by normal mode noise. Thus, this is also a very important value which shows the resistance-to-noise characteristics of the measuring instrument.

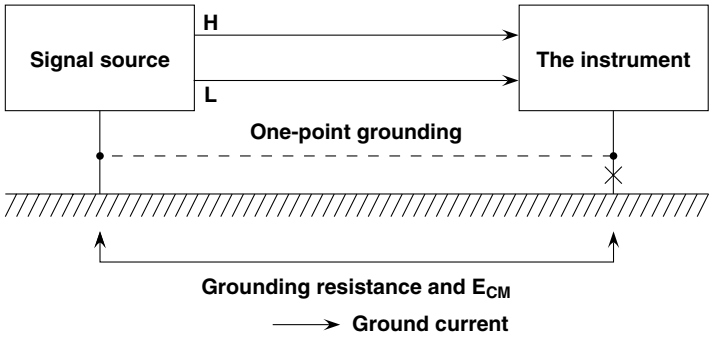
Basics of Anti-Noise Measures (part 2)

Decreasing and Increasing Impedance

As described in the previous section, conversion of common mode noise into normal mode noise causes an error in the measured output. In other words, prevention of such a conversion is the key to anti-noise measures. As can be understood from the previous section, it is important to take the following measures to reduce normal mode noise.

· reduce the wiring resistances R_1 and R_2, including the resistance of the wires.
· increase the coupling impedance of common mode voltage E_{CM}.

These are called the decrease and increase of impedance as basics of anti-noise measures.
In the above discussions, anti-noise measures have been described on the assumption that common mode noise has already been given. In real applications, common mode noise often occurs owing to grounding resistance as shown in the figure below.



In such a case, perform one-point grounding as indicated by the dotted line, as an extreme example of decreasing impedance, to equalize the potentials of the signal source and the instrument. Rejecting common mode noise in this way is the basics of anti-noise measures.

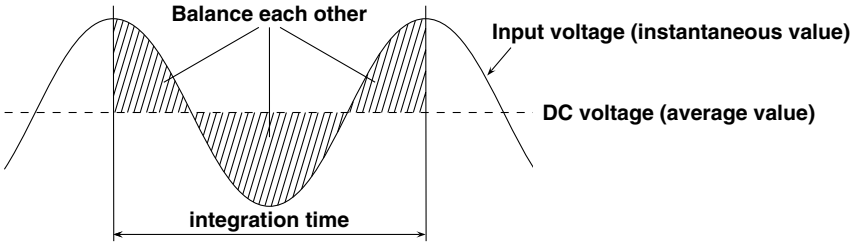
Anti-Noise Measures in the Instrument Itself

Pulse width modulation type A/D converter (PWM type A/D)

This instrument uses a feedback pulse width modulation type A/D converter and has the following features:

- Linearity and stability are good because of the feedback effect.
- Integration type A/D converter ensures excellent noise suppression.

If the integration time is equal to the noise period, the positive and negative sides of the shaded part in the figure below cancel each other out and thus the average value becomes zero.



Normally, an integration time of 20 ms (50 Hz) or 16.7 ms (60 Hz) is selected depending on the commercial power supply frequencies. A 100-ms integration mode is added to the instrument to achieve superior noise rejection. However, when using the 100 ms setting, the smallest measurement interval is longer than in case of the 20 ms or 16.7 ms setting. The integration effect enables the PWM A/D converter to perform the following two functions.

- Rejection of frequency determined by the reciprocal of the integration time and frequencies which are whole multiples of that frequency;
- First-order lag filter provided with cut-off frequency proportional to the reciprocal of the integration time.

The following table compares the integration times of 16.7 ms, 20 ms and 100 ms.

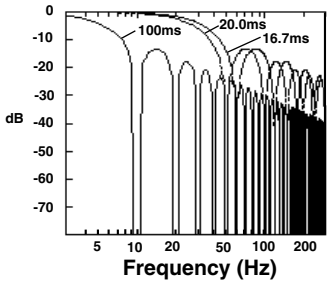
Integration time	Rejection frequency	Cut-off frequency	Remarks
16.7 ms	n×60 Hz	approx. 19 Hz	for 60 Hz
20.0 ms	n×50 Hz	approx. 16 Hz	for 50 Hz
100.0 ms	n×10 Hz	approx. 3.2 Hz	for both 50 Hz/60 Hz

n=1,2,3...

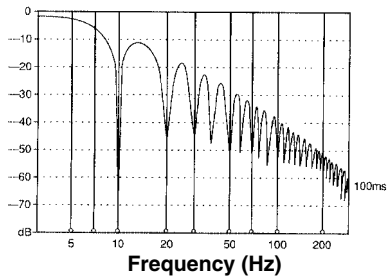
As shown in the table, the merit of 100.0-ms integration is not only that it applies to both 50 and 60 Hz, but also that it provides a low cut-off frequency as the first-order lag filter and improves the noise rejection ability.

The following figure shows the calculation values of the NMRR for three integration times and an example of actual measurement of the NMRR for a 100-ms integration signal.

- Calculated values of NMRR



- Example of actual measurement of NMRR (100 ms)



Noise Filter

This instrument is equipped with a low-pass filter (cutoff-frequency of 10 Hz (for both 50/60 Hz), 50 Hz, 60 Hz) which functions as a way of noise rejection. Also exponential averaging functions as a noise filter.

Anti-Noise Measures: Applications

Practical Measures

- **Reducing noise itself**

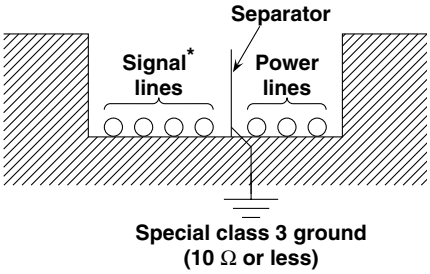
  The basics of this practical measures dictates using the instrument in conditions where noise is suppressed as much as possible.

  - for power lines: an increase of impedance;
    Separate the power lines for noise source equipment (inverter, thyristor, etc.) from those for the measuring instrument.

• for input lines: an increase of impedance;

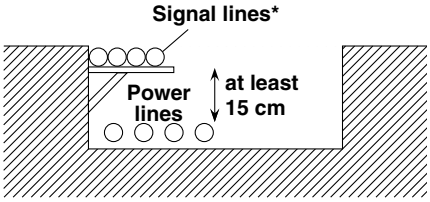
Always separate the input line from the noise source lines (power and alarm lines).

Step 1 : Install a separator.



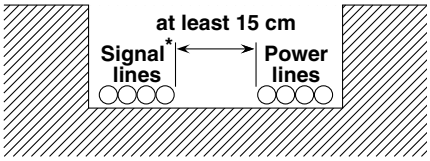
Step 2 : Keep the signal cables at least 15 cm above the power lines using a bracket.

If the power lines are not shielded, the operating voltage is 220 V or less, and the operating current is 10 A or more, the distance between the signal cables and power cords must be 60 cm or more.



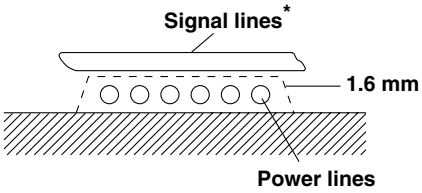
Step 3 : Leave a clearance of at least 15 cm between the signal lines and power lines.

If the power lines are not shielded, the operating voltage is 220 V or less, and the operating current is 10 A or more, the distance between the signal cables and power cords must be 60 cm or more.



Step 4 : Lay the signal lines at right angles to the power lines.

If the power lines are not shielded, separate the signal lines and power lines where they cross using steel sheeting at least 1.6 mm thick.

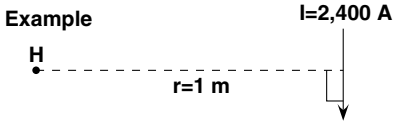


* Separate analog signal lines and communication cables in the same manner as from power cords.

- **When there is influence from a magnetic or electrical field: an increase of impedance**

Step 1 : Keep the noise source as far away as possible.

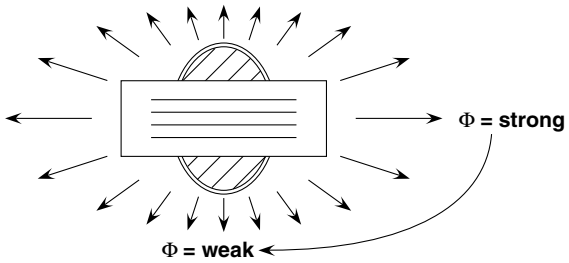
$$\text{Magnetic field strength } H = \frac{I}{2\pi r} = \frac{2{,}400}{6} = 400\,[\text{A/m}]$$



The influence of the external magnetic field on the measuring instrument: 400 A/m or less.

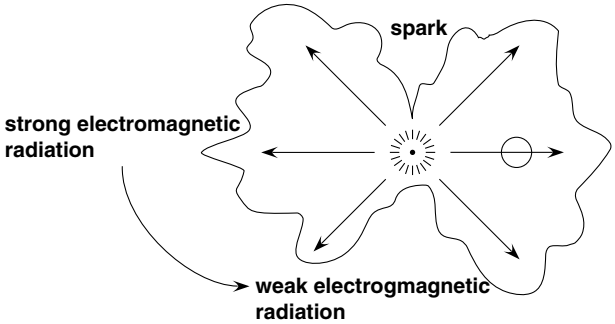
Step 2 : Change the position of the noise source.

A) Leakage magnetic flux of transformer: Φ



Move the instrument to a location where the influence from magnetic flux is weak.

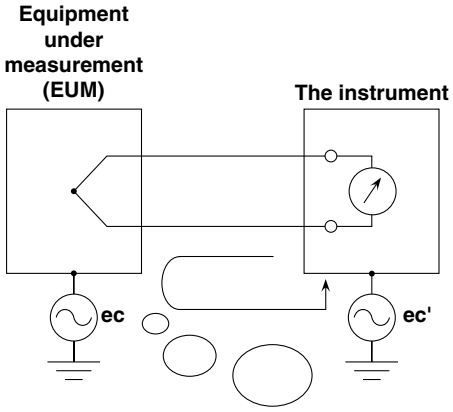
B) Sparks



Move the instrument to a location where the influence from electro-magnetic radiation is weak.

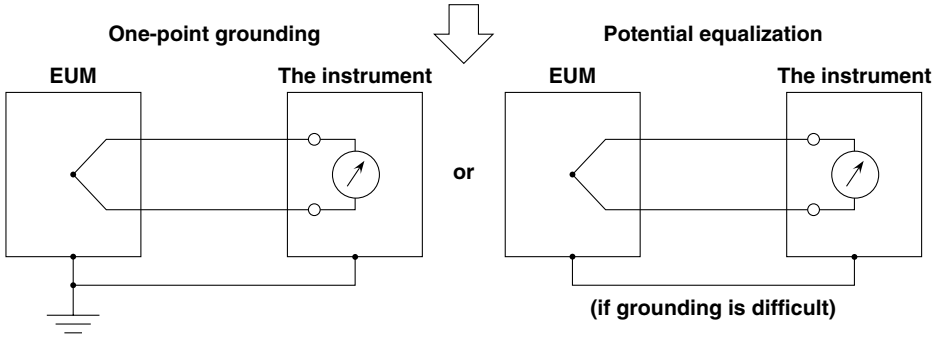
- **Grounding: a decrease of impedance**

The grounding method is the point of common mode noise suppression.



The difference in the potential to the ground between EUM and the instrument may cause a ground current, resulting in noise.

Equalize the potentials to the ground so that the common mode noise becomes zero.

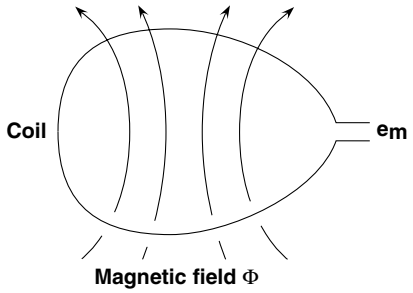


The basic means to obtain stable measurement is to set the circuit potential with proper grounding. Thus, potential equalization is the means to be adopted only when grounding is impossible.

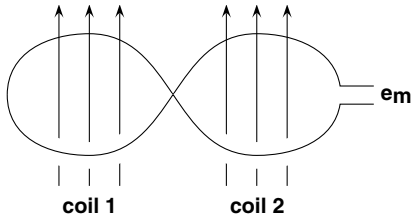
- **Shielded and twisted pair (prevention of electromagnetic coupling): an increase of impedance**

  If it is difficult to keep the noise source away from the measuring instrument due to space limitations, the use of a shielded twisted pair is effective.
  - electrostatic coupling can be completely cut off by shielding;
  - for a magnetic field, shielding with a magnetic material (iron, permalloy, etc.) can be employed. However, there are many restrictions on this use and perfect shielding is impossible. Therefore, use of a twisted pair is preferable.

Voltage e_m induced by the coil is proportional to the area of the coil.
=> The smaller the area of the coil becomes, the smaller the noise becomes.

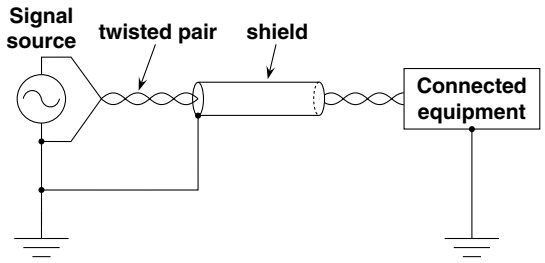


If the directions of coils 1 and 2 are reversed by twisting, as shown, if the areas of the two coils are equal, the induced voltages of the coils offset each other and total induced voltage e_m becomes zero.

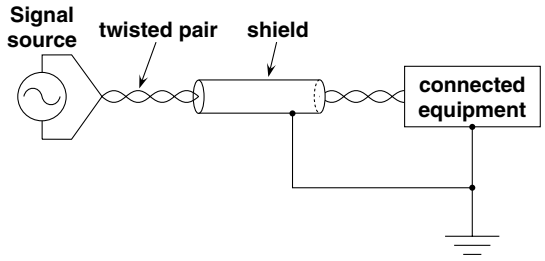


The above two principles are combined as a twisted pair.
Even though a shielded twisted pair is used, a proper grounding method is still important.

If the signal source is grounded



If the signal source is not grounded



Ground the signal cable shields collectively but separately from the power line ground. If the separation of grounds is impossible, use the guard terminal.

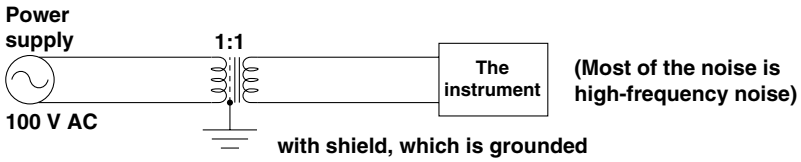
- **Insertion of noise filter and noise killer**

If the influence from noise cannot be eliminated by the methods described before, use noise filter or noise killer.

- Power line noise rejection

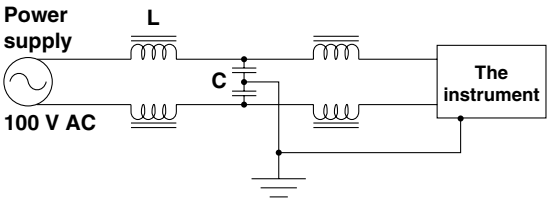
Step 1 : Insert an isolation transformer into the power line.

Increasing impedance to high frequency



Step 2 : Insert a power line noise filter (available on the market).

High frequency noise is divided by decreasing impedance to ground through C and increasing impedance to high frequency through L.



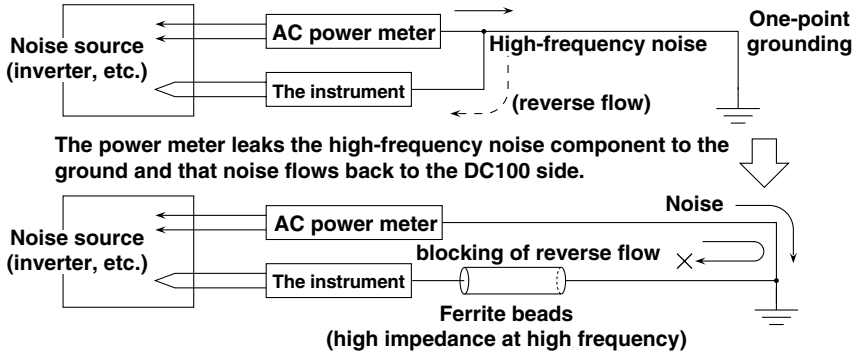
Note 1:Ground the noise filter and the instrument in common.

Note 2:Since insertion of a noise filter increases the bypass current (regarded as leakage current), make sure that the leakage current is within the specified value.

- When the noise contains wide frequency components

While one-point grounding is effective at a low frequency, it sometimes forms a loop and has an adverse effect on a high frequency.

Ex: Connecting a power meter and the instrument grounded at one point to an inverter

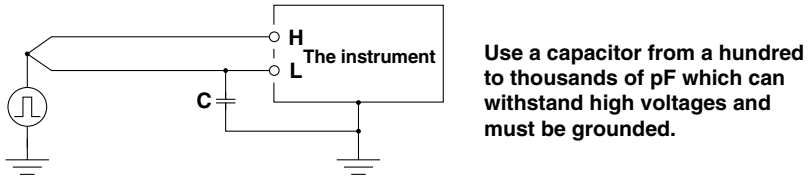


Reverse flow of high-frequency to the instrument is thus suppressed.

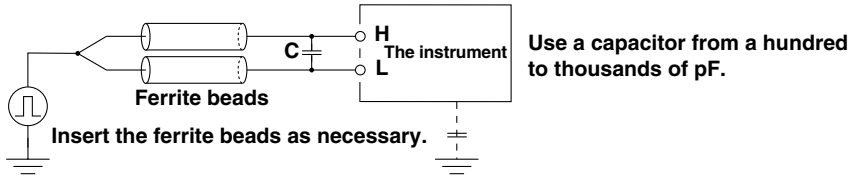
- Input noise rejection

If input noise cannot be rejected by means of one-point grounding or 100-ms integration, insert capacitor or ferrite beads as they are effective in rejecting pulse noise.

Step 1 : Connect a capacitor between the L input and ground.



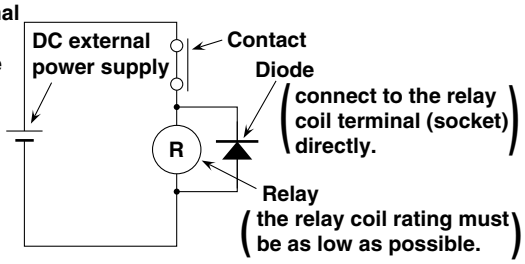
Step 2 : Rejection of pulse noise when grounding is impossible.



• Relay noise suppression

<DC relay>

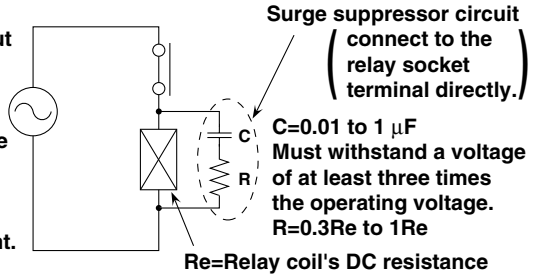
• To prevent noise and protect the contact, connect the diode to the relay coil terminal directly.
• In addition to the above measure, reduce the rated voltage of the relay circuit as much as possible for higher reliability.
• It is necessary to choose a diode that matches the relay. Generally, a diode whose rated rectifying current is at least three times the current flowing through the relay coil must be used.
And the rated reverse voltage must be at least three times the operating voltage.



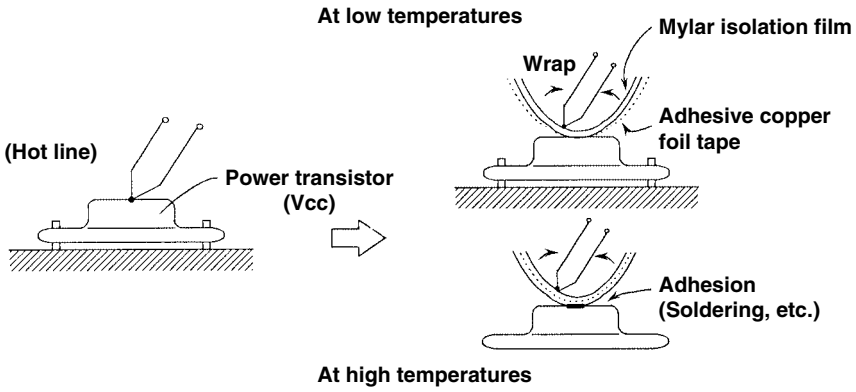
(Note) Across the relay or solenoid coil, a counterelectromotive force is produced by an inductive load. This phenomenon may damage the contact or, as the noise source, cause a malfunctioning of the equipment, and have an unfavorable effect on the entire system.

<AC relay>

• If a relay contact is connectd to the input of the system components, apply the measure shown in the figure above to the relay coil. Otherwise, a counter-electromotive force produced across the coil may be induced on the contact side through the relay's internal coupling or coupling between the lines, and may cause a malfunctioning of the equipment.

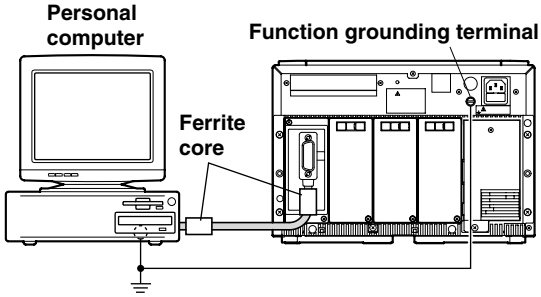


• Others (isolation from noise source: for hot line measurement)



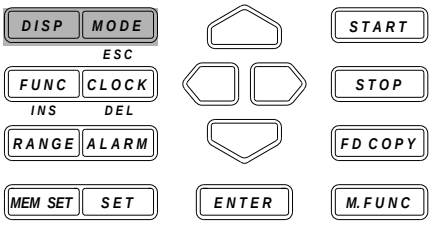
Anti-Noise Measures for PC Connection

When connecting the instrument to a PC, it is recommended to apply ferrite cores (e.g. ZCAT3035-1330 from TDK) to the interface cable as a noise countering measure. Apply a ferrite core on both sides of the cable as shown below. When the noise persists, apply more ferrite cores. Use a shielded cable as the communication cable and make one-point grounding for both the instrument and the function ground terminal of a personal computer.



4.1 Using the AUTO Display

Relevant Keys



Operating Procedure

AUTO Display for the Main Display

1 Select the main display using the DISP key. Direct the arrow mark on the Sub-display upward.
2 Select "AUT" using the MODE key.

Sub-display 1

003	0.0045V	004	0.0931V	▲AUT

AUTO Display for Sub-display 1

1 Select sub-display 1 using the DISP key. Direct the arrow mark on the Sub-display leftward.
2 Select "AUT" using the MODE key.

Sub-display 1

004	0.0926V	005	0.0824V	◀AUT

AUTO Display for Sub-display 2

1 Select sub-display 2 using the DISP key. Direct the arrow mark on the Sub-display downward.
2 Select "AUT" using the MODE key.

Sub-display 1

005	0.8210V	006	0.0095V	▼AUT

Explanation

AUTO Display for the Main Display

Channel No.

Seven characters are used for the channel No. display. The first three characters are used for displaying the channel number. "A" will be displayed in the case of optional computation channels.

If you select TAG at the channel No./TAG setting in the set-up mode (refer to 10.2 on page 10-2), the assigned tag will appear for each channel.

- The first seven characters of the TAG setting will be displayed;
- If the TAG setting consists of only spaces, the channel number will be displayed instead;
- If the first character of the TAG setting is a space, the 2nd to 8th characters will be displayed.

Difference between Channels (delta)

One character is used to let you know that difference between channels (delta) is displayed. However, it will not be displayed in the case of optional computation channels.

Only if you selected the difference between channels (delta) as the input type, "d" will be displayed here.

Alarms

Two characters are used for displaying alarms. One channel is used in the case of optional computation channels.

When an alarm occurs, the kind of alarm will be displayed. When in one channel several alarms occur at the same time, the priority of display becomes H > L > dH > dL > RH > RL. For details on H, L, dH, dL, RH and RL alarms, refer to page 8-2.

Measurement Values

Seven characters are used for displaying the measurement values. The decimal point uses up one character. Nine characters are used in the case of optional computation channels.
When a measurement value does not reach the following value, "– *****" will be displayed.

- DC voltage: a minimum value of the measuring range – (max. value – min. value) × 0.05
- TC/RTD: min. value of the measurement range –10°C
- Linear scaling: –32000, or a minimum value of the span – (max. value – min. value) × 0.05

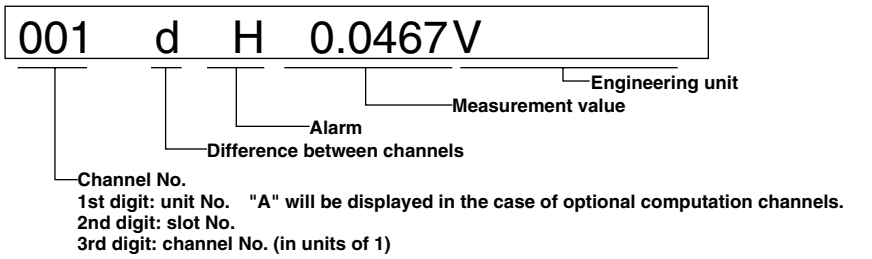
When a measurement value exceeds the following value, "+ *****" will be displayed.

- DC voltage: a maximum value of the measuring range + (max. value – min. value) × 0.05
- TC/RTD: max. value of the measurement range +10°C
- Linear scaling: +32000, or a maximum value of the span + (max. value – min. value) × 0.05

If the input module is not connected properly, " XXXXXX" will be displayed.
While waiting for an input signal, " OOOOOO" will be displayed.

Engineering Units

If the channel number has been selected to appear on the display, six characters are used for displaying engineering units. If TAG has been selected to appear on the display, only three characters are used for displaying units. Only the first three characters of the unit setting will then be displayed, even if the first character of the unit setting is a space.
When " XXXXXX" or " OOOOOO" are displayed as measurement value, no engineering unit will be displayed.



Others

If you selected "SKIP" as the input type, that channel will not be displayed.
When the input type of all channels is set to "SKIP", "***ALL SKIP***" will be displayed.

AUTO Display for Sub-display 1

Data of two channels are displayed here simultaneously.

Channel No., Difference between Channels (delta), Alarms, Measurement Values

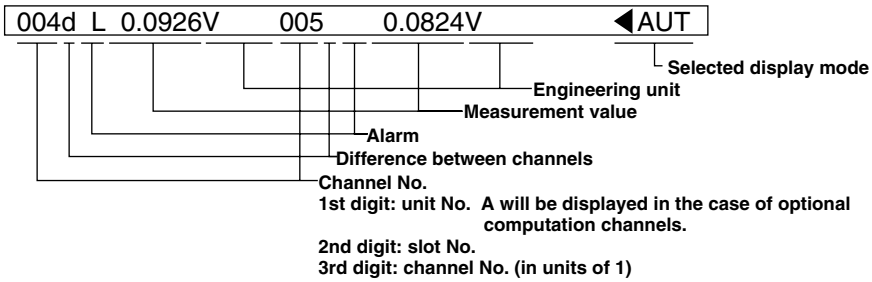
Same as for the main display.

Engineering Units

If the channel number has been selected to appear on the display, the first four characters of the unit setting are used for displaying engineering units. The first four characters will also be displayed, even if the first character of the unit setting is a space. If TAG has been selected to appear on the display or when " XXXXXX" or " OOOOOO" are displayed as measurement value, no engineering unit will be displayed.

Selected Display Mode (refer to page 4-1 for procedure)

This only appears on sub-display 1 when monitoring. The arrow shows to which display the display mode refers.



Others

Same as for the main display.

AUTO Display for Sub-display 2

Data of two channels are displayed here simultaneously.

Channel No., Difference between Channels (delta), Alarms, Measurement Values, and Engineering Units

Same as for the sub-display 1.

Others

Same as for the sub-display 1.

Points to Note when Using the AUTO Display

- When all three displays are set to AUTO display, the main display will start displaying data of the channel with the smallest channel number, on sub-display 1 data of the next two channels will be displayed, while on sub-display 2 data of the next two channels will be displayed. When the data are updated, the display will be replaced with data of the next, consecutive, channel.
- When the input type of all channels is set to "SKIP", then depending on the display as described below, "***ALL SKIP***" will be displayed.
  - When the main display is set to AUTO display, then this will be displayed on the main display, regardless of the settings of sub-display 1 and 2.
  - When sub-display 1 is set to AUTO display, and the main display is set to any other mode than AUTO, then this will be displayed on sub-display 1, regardless of the setting of sub-display 2.
  - When sub-display 2 is set to AUTO display, and the main display is set to any other mode than AUTO, and sub-display 1 to any other mode than AUTO, then this will be displayed on sub-display 2.
  - When on any of the main, sub-display1 or sub-display 2 "***ALL SKIP***" appears, other displays which may have been set to AUTO will turn blank. Only the selected display mode on sub-display 1 and the status display on sub-display 2 will appear.

Sub-status on Sub-display 2

The following status is displayed on the right edge of Sub-display 2.

1: Writing measured/computed data files only.

2: Writing periodic file or report file only.

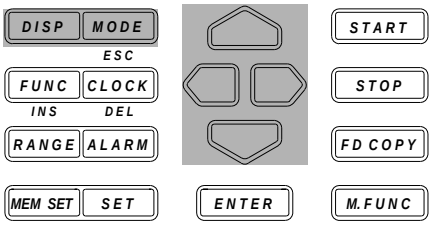
A: Writing measured/computed data file and periodic file or measured/computed data file and report file.

P: Writing paused

B: Binary copying

4.2 Using the MANUAL Display

Relevant Keys



Operating Procedure

MANUAL Display for the Main Display

1 Select the main display using the DISP key.
2 Select "MAN" using the MODE key.

Sub-display 1

002	0.0034V	003	0.0920V	▲MAN

3 Select the required channel using the ⌂ ⌄ keys.

Main display

001 0.0057V

MANUAL Display for Sub-display 1

1 Select sub-display 1 using the DISP key.
2 Select "MAN" using the MODE key.

Sub-display 1

002	0.0422V	003	0.0726V	◀MAN

3 Select the right or left channel using the ◁ ▷ keys. A dash [—] will appear below the unit number of the selected channel.
4 Select the required channel using the ⌂ ⌄ keys.

Sub-display 1

006	0.0892V	003	0.0726V	◀MAN

MANUAL Display for Sub-display 2

1 Select sub-display 2 using the DISP key.
2 Select "MAN" using the MODE key.

Sub-display 1

005	0.0931V	006	0.0092V	▼MAN

3 Select the right or left channel using the ◁ ▷ keys. A dash [—] will appear below the unit number of the selected channel.
4 Select the required channel using the ⌂ ⌄ keys.

Sub-display 2

009	1.0075V	008	0.0154V

Explanation

MANUAL Display for the Main Display

Channel No., Difference between Channels (delta) and Alarms

Same as for the AUTO display (refer to page 4-2).

Measurement Values

Same as for the AUTO display (refer to page 4-2), except for the following.
When the input type of the channel is set to "SKIP", then "SKIP" will be displayed.
When the channel other than the channel of the input module is selected, "- - - - - -" appears.

Engineering Units

Same as for the AUTO display (refer to page 4-2), except for the following.
When the input type of the channel is set to "SKIP", then no engineering unit will be displayed.

MANUAL Display for the Sub-display 1 and 2

Data of two channels are displayed here simultaneously on each display.

Channel No., Difference between Channels (delta), Alarms and Selected Display Mode

Same as for the AUTO display (refer to page 4-3).

Measurement Values

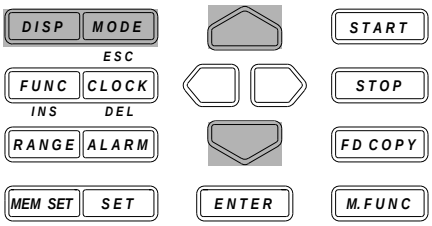
Same as for the AUTO display (refer to page 4-3), except for the following.
When the input type of the channel is set to "SKIP", then "SKIP" will be displayed.
When the channel other than the channel of the input module is selected, "- - - - - -" appears.

Engineering Units

Same as for the AUTO display (refer to page 4-3), except for the following.
When the input type of the channel is set to "SKIP", then no engineering unit will be displayed.

4.3 Using the PAGE Display

Relevant Keys



Operating Procedure

1 Select the main display using the DISP key.
2 Select "PGE" using the MODE key.

Sub-display 1

002	0.1936V	003	0.0995V	▲PGE

3 Select the required set of five channels (page) using the ⌂ ⌄ keys.

Display

006		0.0173V		
007	0.0197V	008	0.0074V	▲PGE
009	0.0162V	010	0.0102V	

Explanation

PAGE Display for the Main Display

When this display is selected, the measurement values of five consecutive channels will be displayed using sub-display 1 and 2 also.

Channel No., Difference between Channels (delta) and Alarms

Same as for the AUTO display (refer to page 4-2).

Measurement Values

Same as for the AUTO display (refer to page 4-2), except for the following.
When the input type of the channel is set to "SKIP", then "SKIP" will be displayed.
When the channel other than the channel of the input module is selected, "- - - - -" appears.

Engineering Units

Same as for the AUTO display (refer to page 4-2), except for the following.
When the input type of the channel is set to "SKIP", then no engineering unit will be displayed.

PAGE Display for the Sub-display 1 and 2

In combination with the page display of the main display, data of two channels are displayed here simultaneously on each display. Other display modes cannot be selected.

Channel No., Difference between Channels (delta), Alarms and Selected Display Mode

Same as for the AUTO display (refer to page 4-3).

Measurement Values

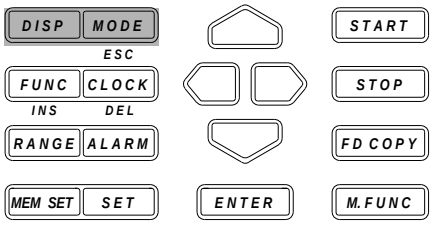
Same as for the AUTO display (refer to page 4-3), except for the following.
When the input type of the channel is set to "SKIP", then "SKIP" will be displayed.
When the channel other than the channel of the input module is selected, "- - - - -" appears.

Engineering Units

Same as for the AUTO display (refer to page 4-3), except for the following.
When the input type of the channel is set to "SKIP", then no engineering unit will be displayed.

4.4 Using the ALARM SEARCH Display

Relevant Keys



Operating Procedure

ALARM SEARCH Display for the Main Display

1 Select the main display using the DISP key.
2 Select "SER" using the MODE key.

Sub-display 1

003	0.0054V	004	0.0319V	▲SER

ALARM SEARCH Display for Sub-display 1

1 Select sub-display 1 using the DISP key.
2 Select "SER" using the MODE key.

Sub-display 1

004	H 0.0269V	005	RH 0.0248V	◀SER

ALARM SEARCH Display for Sub-display 2

1 Select sub-display 2 using the DISP key.
2 Select "SER" using the MODE key.

Sub-display 1

005	0.2108V	006	0.0951V	▼SER

Explanation

ALARM SEARCH Display for the Main Display

Only the channels in which an alarm occurred, will be displayed. When an alarm occurs in several channels, the channels will be displayed consecutively.

Channel No., Difference between Channels (delta), Alarms, Measurement Values and Engineering Units

Same as for the AUTO display (refer to page 4-2).

Others

When the input types of all channels are set to "SKIP" or no alarms occur, "***NO ALARM***" will be displayed.

ALARM SEARCH Display for the Sub-display 1 and 2

Only the channels in which an alarm occurred, will be displayed. Two channels will be displayed on each sub-display.

Channel No., Difference between Channels (delta), Alarms, Measurement Values, Engineering Units and Selected Display Mode

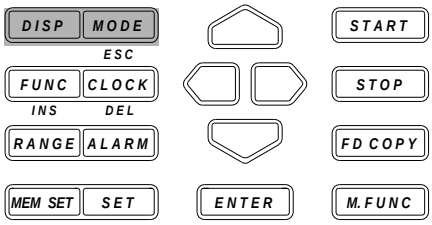
Same as for the AUTO display (refer to page 4-3).

Points to Note when Using the ALARM SEARCH Display

- When all three displays are set to ALARM SEARCH display, the main display will start displaying data of the channel with the smallest channel number, on sub-display 1 data of the next two channels will be displayed, while on sub-display 2 data of the next two channels will be displayed. When the data are updated every two seconds, the display will be replaced with data of the next, consecutive, channel.
- When the input type of all channels is set to “SKIP”, then depending on the display settings as described below, “***NO ALARM***” will be displayed.
  - When the main display is set to ALARM SEARCH display, then this will be displayed on the main display, regardless of the settings of sub-display 1 and 2.
  - When sub-display 1 is set to ALARM SEARCH display, and the main display is set to any other mode than ALARM SEARCH, then this will be displayed on sub-display 1, regardless of the setting of sub-display 2.
  - When sub-display 2 is set to ALARM SEARCH display, and the main display is set to any other mode than ALARM SEARCH, and sub-display 1 to any other mode than ALARM SEARCH, then this will be displayed on sub-display 2.
  - When on any of the main, sub-display1 or sub-display 2 “***NO ALARM***” appears, other displays which may have been set to ALARM SEARCH will turn blank. Only the selected display mode on sub-display 1 and the status display on sub-display 2 will appear.

4.5 Using the FILE UTILIZATION Display

Relevant Keys



Operating Procedure

FILE UTILIZATION Display for Sub-display 1

1 Select sub-display 1 using the DISP key.
2 Select "FLE" using the MODE key.

Sub-display 1

F> ||||||||||||||||||||| < 50% 10100000 ◀ FLE

FILE UTILIZATION Display for Sub-display 2

1 Select sub-display 2 using the DISP key.
2 Select "FLE" using the MODE key.

Sub-display 1 and 2

F> ||||||||||||||||||||| < 50% 10100000 ▼ FLE
F> ||||||||||||||||||||| < 50% 10100000

Explanation

FILE UTILIZATION Display

File utilization can be displayed in sub-display 1 or 2.

- File utilization during the present writing is displayed on a bar graph.
- A graph corresponding to the utilization is displayed as a discrete-segment bar graph in which the entire file utilization is equally divided into 40 segments.
- The utilization percentage and the corresponding file name are displayed on the right of the bar graph.

When Saving Report Data and Measured/computed Data

F> |||||||| <50% 90101010 >H: ■ D: ■ M:□ ◀FLE

- Monthly report ON/OFF
- Daily report ON/OFF
- Hourly report ON/OFF
- Measured/computed data file name
- Measured/computed data file utilization
- Measured/computed data file utilization(bar graph)

When Saving Periodic Data and Measured/computed Data

F> |||||||| <50% 90101010 >|||| <25% 9010101Z ◀FLE

- Periodic file name
- Periodic file utilization
- Periodic utilization(bar graph)
- Measured/computed data file name
- Measured/computed data file utilization
- Measured/computed data file utilization(bar graph)

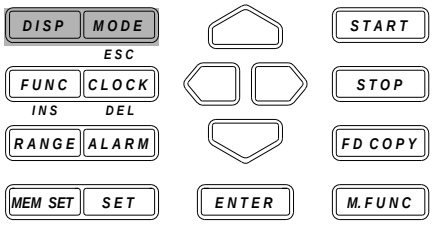
When Saving Report Data

F>Hourly: □ Daily: □ Monthly: □ ◀FLE

- Monthly report ON/OFF
- Daily report ON/OFF
- Hourly report ON/OFF

4.6 Using the MEMORY UTILIZATION Display

Relevant Keys



Operating Procedure

MEMORY UTILIZATION Display for Sub-display 1

1 Select sub-display 1 using the DISP key.
2 Select "MEM" using the MODE key.

Sub-display 1

M> |||||||||||||||||||	< 50. 0% (1M)	◀MEM

MEMORY UTILIZATION Display for Sub-display 2

1 Select sub-display 2 using the DISP key.
2 Select "MEM" using the MODE key.

Sub-display 1 and 2

M> |||||||||||||||||||	< 50. 0% (1M)	▼MEM
M> |||||||||||||||||||	< 50. 0% (1M)	

Explanation

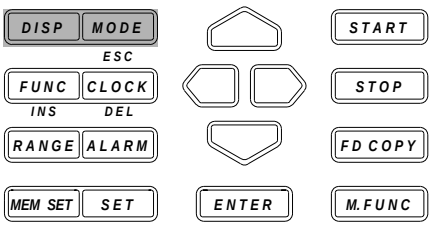
MEMORY UTILIZATION Display

Memory utilization can be displayed in sub-display 1 or 2.

- The remaining capacity of the built-in RAM disk is displayed on a bar graph.
- A graph corresponding to the utilization is displayed as a discrete-segment bar graph in which the entire file utilization is equally divided into 40 segments.
- The utilization percentage and the built-in memory capacity are displayed on the right of the bar graph.

4.7 Using the BARGRAPH Display

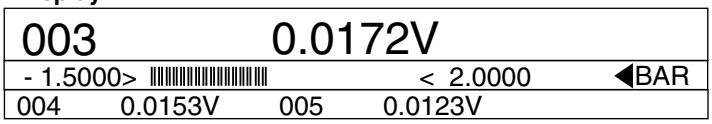
Relevant Keys



Operating Procedure

1 Select the sub-display 1 using the DISP key.
2 Select "BAR" using the MODE key.

Display



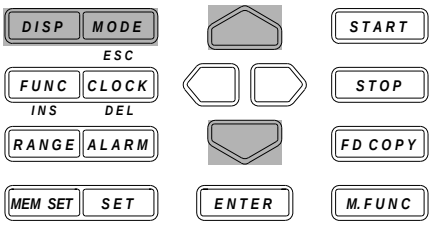
Explanation

Bargraph Display

Sub-display 1 can be turned into a bargraph display.
The measurement data on the main display are displayed as a bargraph on sub-display 1. The bargraph shows a graph corresponding to the measurement value, showing the span divided into 40 equal parts. The left side of the bargraph shows the left span, the right side of the bargraph shows the right span. When you are using the linear scaling function, the left and right side of the bargraph show the left scaling and right scaling value respectively. Engineering units are not displayed.
When the main display shows "SKIP", "***ALL SKIP***", "NO ALARM", "OOOOOO", "XXXXXX", or "- - - - - -", the bargraph will not appear. Only the selected display mode will appear.

4.8 Using the ALARM STATUS Display

Relevant Keys



Operating Procedure

ALARM STATUS Display for Sub-display 1

1 Select the sub-display 1 using the DISP key.
2 Select "ALM" using the MODE key.

Sub-display 1

001□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□◀ALM

3 Select the range to be displayed in blocks of 10 channels using the ⌓⌔ keys.

Sub-display 1

011□□□□□□□□□□ □□□□□□□□□□ ◀ALM

ALARM STATUS Display for Sub-display 2

1 Select the sub-display 2 using the DISP key.
2 Select "ALM" using the MODE key.

Sub-display 1 and 2

001□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□▼ALM
001□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□

3 Select the range to be displayed in blocks of 10 channels using the ⌓⌔ keys.

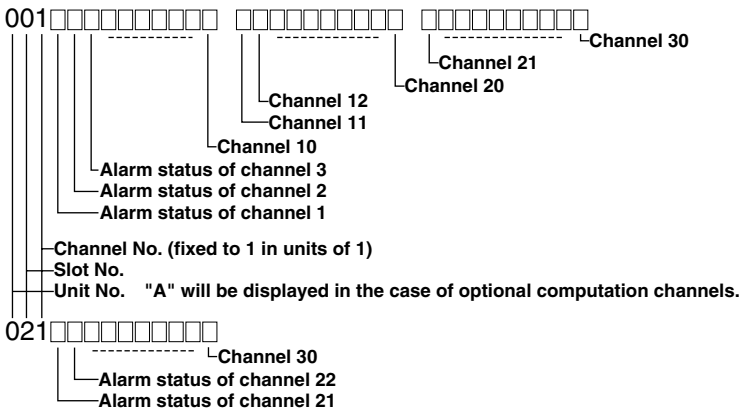
Sub-display 1 and 2

001□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□▼ALM
011□□□□□□□□□□ □□□□□□□□□□

Explanation

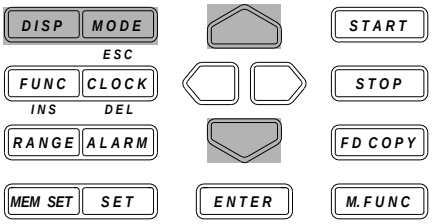
Alarm Status Display

The status of alarms can be displayed on sub-display 1 and 2.
On each sub-display the alarms of maximum 30 channels can be monitored which also depends on the number of input channels. The display shows "□" for channels where no alarm has occurred, and shows "■" for channels where an alarm has occurred. The relation between the alarm status display and channel number is as shown below.



4.9 Using the RELAY STATUS Display

Relevant Keys

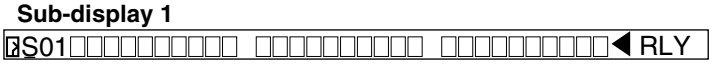


Operating Procedure

RELAY STATUS Display for Sub-display 1

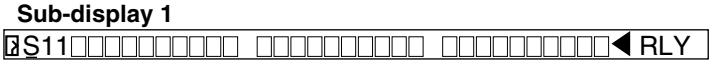
1 Select the sub-display 1 using the DISP key.
2 Select "RLY" using the MODE key.

Sub-display 1



3 Select the range to be displayed in blocks of 10 channels using the ⌓ ⌔ keys.

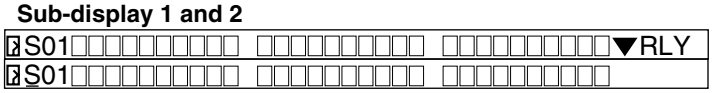
Sub-display 1



RELAY STATUS Display for Sub-display 2

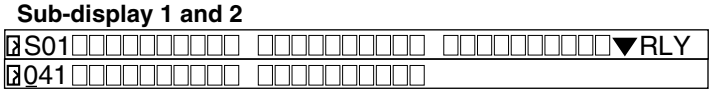
1 Select the sub-display 2 using the DISP key.
2 Select "RLY" using the MODE key.

Sub-display 1 and 2



3 Select the range to be displayed in blocks of 10 channels using the ⌓ ⌔ keys.

Sub-display 1 and 2



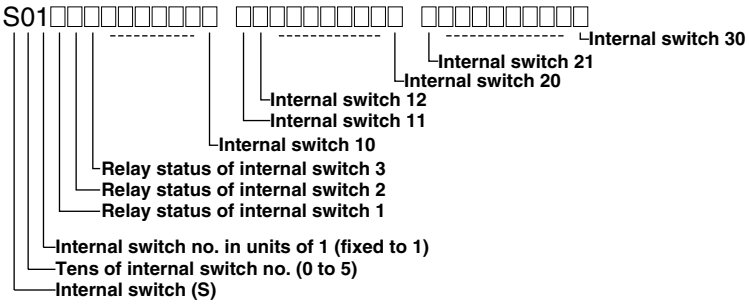
Explanation

Relay Status Display

The status of relays can be displayed on sub-display 1 and 2.
On each display the status of maximum 30 relays can be monitored. The display shows "□" for relays which are currently not operated by internal switch/alarm output relay, and shows "■" for relays which are currently operated by internal switch/alarm output relay.

Relation between the Relay Status and Internal Switch

If the relay status of the internal switches is being displayed, an "S" will be displayed as the first character. The next two characters show the number of the internal switch which corresponds to the first batch of the display and range from 01 to 51. There are 60 internal switches.

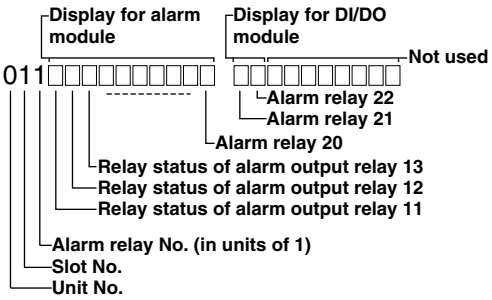


Relation between the Relay Status and Alarm Output Relay

If the relay status of the alarm output relays is being displayed, a unit number will be displayed in the first character position. The slot number in the second character position represents the number of slot in which the alarm module or the DI/DO module is mounted. The alarm output relay is different in relay status display whether it is in the alarm module or in the DI/DO module as shown below.

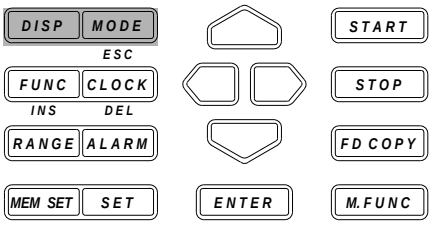
- If an alarm module is mounted, ten □ or ■ indicators are displayed.
- If the DI/DO module is mounted, ten □ or ■ indicators are displayed but the right 8 indicators of ten are not used because two alarm output relays are used.

Example for mounting the alarm module and the DI/DO module:



4.10 Using the CLOCK (Data & Time) Display

Relevant Keys



Operating Procedure

1 Select the sub-display 2 using the DISP key.
2 Select "CLK" using the MODE key.

Sub-display 1 and 2

005	0.8210V	006	0.0095V	▼CLK
Dec. 30. 95	13:16:19			

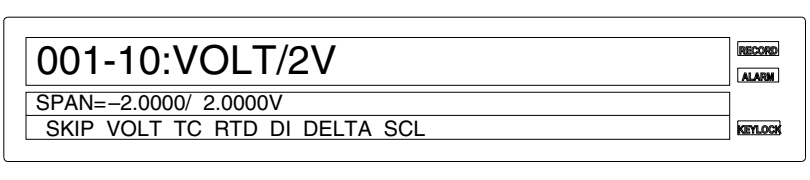
Explanation

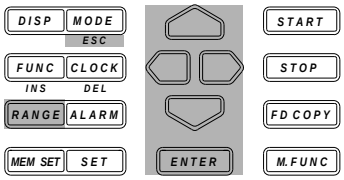
Clock Display

The date and time can be displayed on sub-display 2.
According to the set time in 3.10, "Setting the Date and Time" (see page 3-29), the current date and time is displayed.
The display shows the month, day, year and hour, minute, second in this sequence.

5.1 Setting the Type of Input and Span

Relevant Keys





Operating Procedure

1 Press the RANGE key to enter the RANGE menu.
2 Select/set using the keys.
3 To escape from a lower menu, press the "MODE (ESC)" key. Its main menu will appear, although new settings/selections will not be kept.
4 New settings/selections will be kept when you reach the final display of that setting.

(Main menu)
001-01:VOLT/2V
>Select Channel No.
↓
001-01:VOLT/2V
>Select Channel No.

(Lower menu)

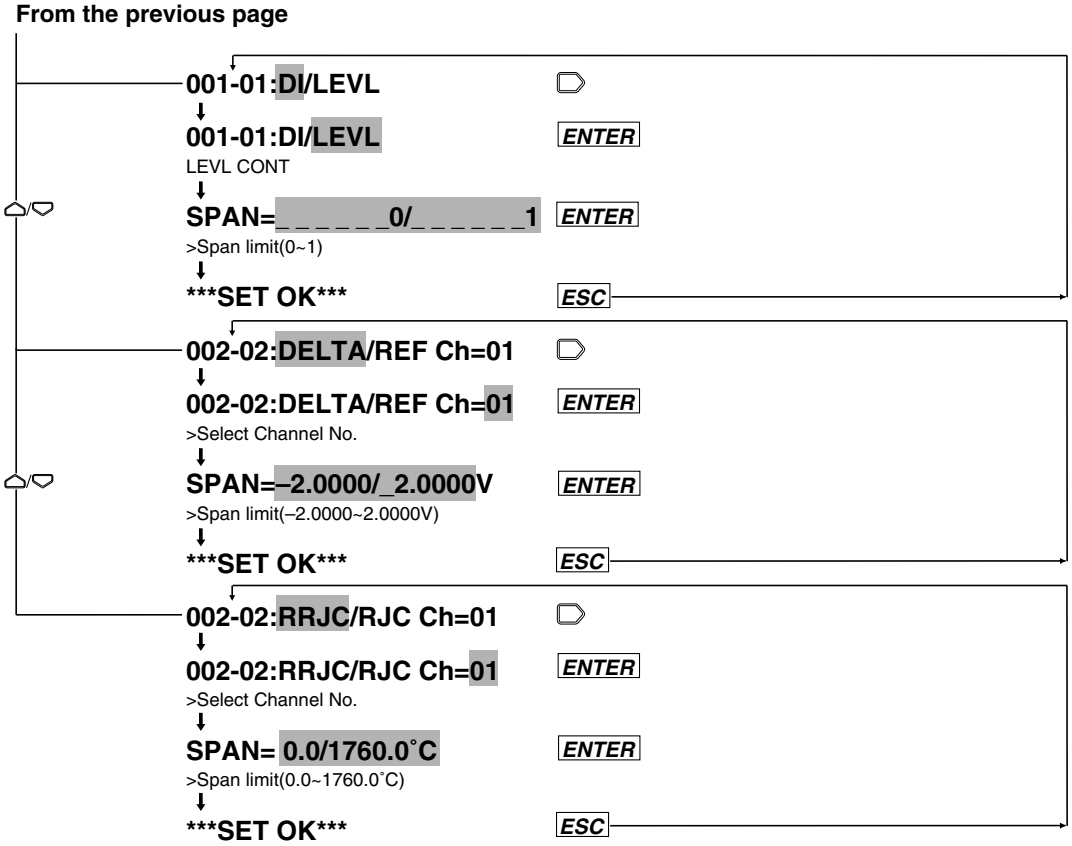
001-01:VOLT/2V ENTER
20mV 60mV 200mV 2V 6V 20V 50V
↓
SPAN=–2.0000/_2.0000V ENTER
>Span limit(–2.0000~2.0000V)
↓
*****SET OK***** ESC

001-01:SKIP ENTER
↓
*****SET OK***** ESC

001-01:TC/R
↓
001-01:TC/R ENTER
R S B K E J T N W L U KP
↓
SPAN=_ _ _ _0.0/1760.0˚C ENTER
>Span limit(0.0~1760.0˚C)
↓
*****SET OK***** ESC

001-01:RTD/PT1
↓
001-01:RTD/PT1 ENTER
PT1 PT2 JPT1 JPT2 PT50 NI1 NI2 NI3
CU1 CU2 CU3 CU4 PT1S PT2S JPT1S
JPT2S J263B
↓
SPAN=–_200.0/_ _600.0˚C ENTER
>Span limit(–200.0~600.0˚C)
↓
*****SET OK***** ESC

To the next page



Explanation

Setting the Channel No.

This setting specifies the channels to which the type of input and span apply. Set a range of channels in the same unit, whether you specify from what channel (the first channel) to what channel (the last channel).

First Channel No. (Begin)

The first three characters on the main display show the number of the first channel to which settings apply.

- A numeral in the first character position shows a unit number. A numeral in the second character position represents a module number (slot number).
- Setting range: Determined by the positions in which the input modules are connected. For details, see page 3-8.

Last Channel No. (End)

The two characters following the first channel number show the number of the last channel to which settings apply.

- Setting range: See description of the above “The first channel number.” The number of the last channel cannot be smaller than the number of the first channel. When both channel numbers are equal, settings will only apply to that particular channel. When you have set the first channel number and you move the cursor to the last channel setting, the channel number of the first channel setting will appear here.

Selecting the Type of Input

The following types of input can be selected. The default setting is VOLT.

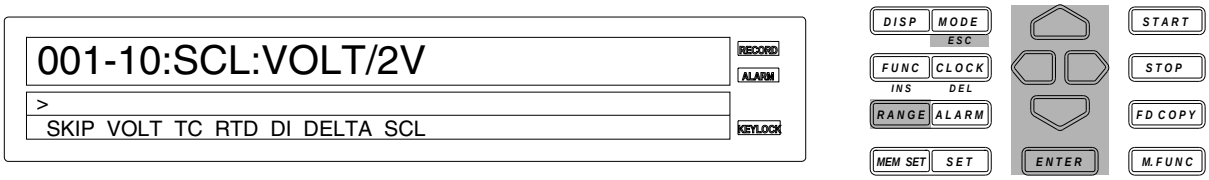
- SKIP
  Measurement, data saving and display (except for page display) will not be carried out. Measurement, data saving and display will be carried out for the next channel whose input type is not set to SKIP.
- VOLT (DC voltage)
  This input type can be selected from 20mV, 60mV, 200mV, 2V, 6V, 20V and 50V. Refer to chapter 14 for the measurement range of each setting. The default setting is 2V.
- TC (thermocouple)
  This input type can be selected from R, S, B, K, E, J, T, N, W, L, U and KP (KPvsAu7Fe). Refer to chapter 14 for the measurement range of each setting. The default setting is R.
- RTD (resistance temperature detector)
  This input type can be selected from PT1 (Pt100 1mA), PT2 (Pt100 2mA), JPT1 (JPt100 1mA), JPT2 (JPt100 2mA), PT50 (Pt50 2mA), NI1 (Ni100 1mA SAMA), NI2 (Ni100 1mA DIN), NI3 (Ni120 1mA), CU1 (Cu10 GE), CU2 (Cu10 L&N), CU3 (Cu10 WEED), CU4 (Cu10 BAILEY), PT1S (Pt100 1mA high resolution), PT2S (Pt100 2mA high resolution), JPT1S (JPt100 1mA high resolution), JPT2S (JPt100 2mA high resolution) and J263B (J263*B). Refer to chapter 14 for the measurement range of each setting. The default setting is PT1.
- DI (voltage level: LEVL; contact:CONT)
  This input type can be selected from LEVL and CONT.
  In case of LEVL, a voltage of less than approx. 2.4 V will be recognized as “0 (OFF)”, whereas a voltage of approx. 2.4 V or more (max. allowable voltage is up to ±60 VDC) will be recognized as “1 (ON)”.
  In case of CONT, an open, externally connected contact to which no voltage is applied, will be recognized as “0 (OFF)”, whereas a closed contact will be recognized as “1 (ON)”.
  The default setting is LEVL.
- DELTA (difference between channels)
  Computation can be done only in the same unit. Destination channels should lie within the first channel No. to the last channel No. range. The number of the reference channel (REF) should be lower than the number of the destination channels. The default setting for the reference channel is 01.
  The type of input and the measuring range in the distination channel are the same as for the reference channel. After setting the DELTA (difference between channels), if you attempted to change the type of input and the measuring range, setting the difference between channels is released, thereby the type of input and the measuring range in the destination channel are returned to their original settings, and the span is returned to its initial value.
- RRJC (Remote RJC, available if the instrument is equipped with the optional MATH function)
  Reference channel (RJC): Within the setting range of reference channel No.
  TC (thermocouple) must be selected as the type of input to the reference channel.
  If the channel No. or type of input for the reference channel, or the type of thermocouple is changed, the alarm function will be turned OFF.
  If the type of input for the reference channel or the type of thermocouple is changed, the RRJC settings will be cleared and the type of input and measuring range for the reference channel will be set to the one which was in effect before the change was made. The span will be set to the initial value of the measuring range.
- mA (DC current, mA input module)
  This input can be set only for mA input channels. The measuring range is -20 mA to 20 mA.

Setting the Span

The measurement range is decided according to the type of input. The left and right span must lie within the measurement range. However, the span is 0 to 1 for the DI input type. By setting the span, the setting range for the upper/lower alarm limit of the rate-of-change is determined. The value on the left side of the SPAN menu shows the left span, and the value on the right side of the SPAN menu shows the right span.
For the remote RJC, the setting range for span is the same as that for the reference channel.

5.2 Setting Linear Scaling and the Span

Relevant Keys



Operating Procedure

1 Press the RANGE key to enter the RANGE menu.
2 Select/set ▭ using the △▽ keys.
3 To escape from a lower menu, press the "MODE (ESC)" key. Its main menu will appear, although new settings/selections will not be kept.
4 New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

001-01:VOLT/2V▷
>Select Channel No.
↓
001-01:VOLT/2V▷ → **001-01:VOLT/2V**
>Select Channel No.

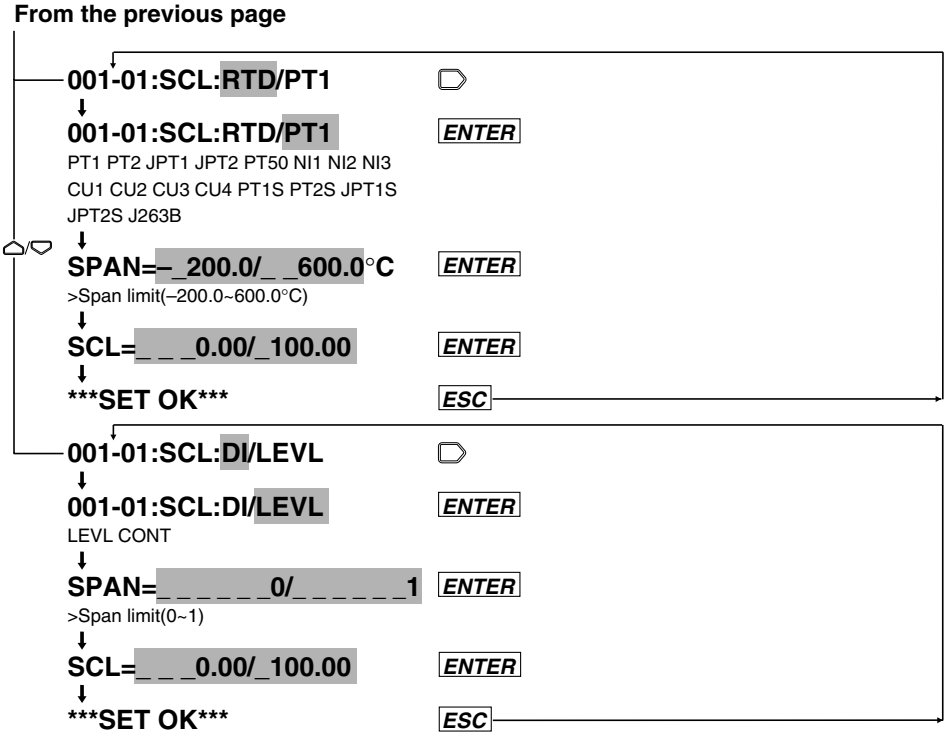
(Lower menu)

△/▽ → **001-01:SCL:VOLT/2V** ▷
↓
001-01:SCL:VOLT/2V ▷
↓
001-01:SCL:VOLT/2V *ENTER*
20mV 60mV 200mV 2V 6V 20V 50V
↓
SPAN=–2.0000/_2.0000V *ENTER*
>Span limit(–2.0000~2.0000V)
△/▽
↓
SCL=_ _ _0.00/_100.00 *ENTER*
↓
*****SET OK***** *ESC* → (back to 001-01:SCL:VOLT/2V)

001-01:SCL:TC/R ▷
↓
001-01:SCL:TC/R *ENTER*
R S B K E J T N W L U KP
↓
SPAN=_ _ _ _0.0/_1760.0˚C *ENTER*
>Span limit(0.0~1760.0˚C)
△/▽
↓
SCL=_ _ _0.00/_100.00 *ENTER*
↓
*****SET OK***** *ESC* → (back to 001-01:SCL:TC/R)

To the next page

From the previous page



Explanation

The setting of the channel number is the same as explained in 5.1 on page 5-2. The following explanation assumes that you already carried out the channel setting and that you selected "SCL" as the input type.

Selecting the Input Type for Linear Scaling

The input type can be selected from the following. The default setting is VOLT.

- VOLT (DC voltage)
  Refer to page 5-3.
- TC (thermocouple)
  Refer to page 5-3.
- RTD (resistance temperature detector)
  Refer to page 5-3.
- DI (contact)
  Refer to page 5-3.
- mA (DC current)
  Refer to page 5-3.

Setting the Span

Refer to page 5-3.

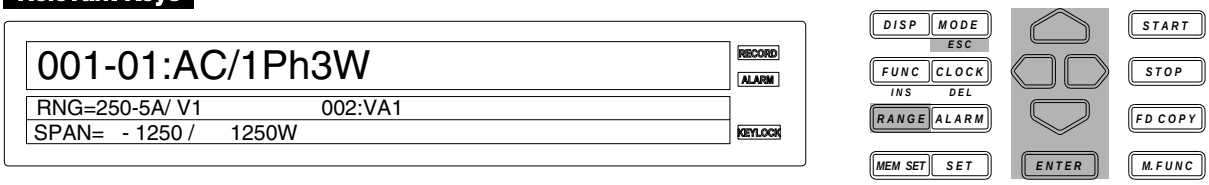
Setting the Scaling Values (SCL)

The left scaling and right scaling values are set following the left and right span values of the span menu. The value on the left side of the SCL menu shows the left scaling value, and the value on the right side of the SCL menu shows the right scaling value. The setting ranges from -30000 to 30000.

- The decimal point can be set in any position of the scale as shown below. Set it when the left scale is set.
  "□.□□□□," "□□.□□□," "□□□.□□," "□□□□.□," or "□□□□□."
- The default settings are 0.00 for the left span and 100.00 for the right span.
  For details on setting the engineering units for linear scaling, refer to page 8-5.

5.3 Configuring the Input Range and Span or the Linear Scaling of a Power Monitoring Channel

Relevant Keys



Operating Procedure

- Press the RANGE key to enter the RANGE menu.
- Using ◁ ▷ and ▭, select and/or enter a value for each of the shaded fields shown below.
- To exit any of the following menu items during the procedure, press the MODE (ESC) key. This returns to the first item of the menu. Note, however, that your new settings and selections are canceled.
- Reaching the step showing the message "***SET OK***" confirms the latest settings/ selections.

Setting the Measuring Range and Span

(Main menu item)

001-01:AC/1Ph3W ▷

↓

001-01:AC/1Ph3W ▷

↓

001-01:AC/1Ph3W ▷

SKIP AC SCL

↓

001-01:AC/1Ph3W ENTER

1Ph2W 1Ph3W 3Ph3W-2I 3Ph3W-3I 3Ph4W

↓

RNG= 250V - 5A/P1 ▷

250V-0.5A 250V-5A 25V-0.5A 25V-5A

↓

RNG= 250V - 5A/P1 ENTER

P1 P3 P13

↓

SPAN= - 125.0/125.0W ENTER

>Span Limit (- 125.0 to 125.0W)

↓

SET OK (configuration complete) ESC → (returns to the first ↓ above)

Setting Linear Scaling

(Main menu item)

001-01:AC/1Ph3W ▷

>Select Channel No.

↓

001-01:AC/1Ph3W ▷ → **001-01:AC/1Ph3W** (Submenu items)

>Select Channel No. ◁▷

001-01:SCL:AC/1Ph3W ▷ (Press twice)

↓

001-01:SCL:AC/1Ph3W ENTER

2k 20k 200k

↓

RNG=250V-0.5A/P13 ▷

250V-0.5A 250V-5A 25V-0.5A 25V-5A

↓

RNG=250V-0.5A/P13 ENTER

P1 P2 P3 P13

↓

SPAN=–125.0/125.0W ENTER

>Span limit(–125.0 to 125.0W)

↓

SCL=0.00/100.00 ENTER

↓

SET OK (configuration complete) ESC → (returns to the first ↓ above)

Explanation

Setting the Channel Number

This procedure sets the channel number for which you want to show and record the values of a parameter selected from the effective voltage, effective current, active power, reactive power, apparent power, frequency, power factor and phase angle which were calculated using the measured data. Therefore, it does not correlate with the terminals of an input module. In this procedure, determine from which channel (starting channel) to which channel (ending channel) you want to include in your configuration.

Starting Channel Number

The first three digits on the main display constitute the starting channel number.

- The first digit is the unit number. The second digit denotes the module number (slot number).
- The configurable range depends on the location where the power monitor module is connected. See page 3-8 for more information.

Ending Channel Number

The two digits that follow the starting channel number constitute the ending channel number. Normally, the starting channel number and the ending channel number should be the same. If you want to skip any consecutive number of channels, enter the range of those channel numbers.

- When you move the cursor from the starting to the ending channel number, the ending channel number becomes the same as the last two digits of the starting channel number.

Setting the Wiring Method

Select from the following methods:

Single-phase two-wire (1Ph2W)
Single-phase three-wire (1Ph3W; three-wire input modules only)
Three-phase three-wire 2 Voltage 2 Current (3Ph3W-2I; three-wire input modules only)
Three-phase three-wire 3 Voltage 3 Current (3Ph3W-3I; three-wire input module only)
Three-phase four-wire (3Ph4W; three-wire input modules only)

Setting the Input Range

Select from the following ranges:

250V-0.5A 250V-5A
25V-0.5A 25V-5A

This setting is common to all channels. Any change to this setting also changes the settings of the rest of the channels. Impose a voltage or current signal to the input module within the limits you set here.

Note

If the connection method or input range is changed, alarm setting is turned off.

Setting the Parameter Being Shown and Saved

A power monitor module measures the voltage or current through the respective channels. The values that are shown and saved are not those of the voltage and current being actually measured through each channel but the values of the parameters you set here.

A combination of parameters being measured is fixed for each group of channels 1-2, 3-4 and 5-6 within the same module. For example, setting channel 1 to P1 (active power 1) sets channel 2 to VA1 (apparent power 1). In addition, the configurable parameters being measured varies depending on the wiring method selected. See the lists on the next page for more information.

The respective mnemonics in the lists should be interpreted as noted below:

Vi (i=1, 2, 3) : effective voltage	Ii (i=1, 2, 3) : effective current
V13 : (V1+V3)/2	I13 : (I1+I3)/2
V0 : (V1+V2+V3)/3	I0 : (I1+I2+I3)/3
Pi (i=1, 2, 3) : active power	Vari (i=1, 2, 3) : reactive power
P13 : (P1+P3)/2	Var13 : Var1+Var3
P0 : P1+P2+P3	Var 0 : Var1+Var2+Var3
VAi (i=1, 2, 3) : apparent power	PFi (i=1, 2, 3) : power factor
VA13 : VA1+VA3	PF13 : $P13/(PF13^2+Var13^2)^{1/2}$=P13/VA13
VA0 : VA1+VA2+VA3	PF0 : $P0/(P0^2+Var0^2)^{1/2}$=P0/VA0
PHi (i=1, 2, 3) : phase	FREQ : frequency
PH13 : $\tan^{-1}$ (Var13/P13)	
PH0 : $\tan^{-1}$ (Var0/P0)	

Single-phase two-wire configuration

CH1	CH2	CH3	CH4	CH5	CH6
P1	VA1	V1	I1	PF1	PH1
				Var1	PF1
				FREQ	V1

Select from these combinations

Single-phase three-wire/three-phase three-wire configurations (dual-voltage, dual-current; modules for three-phase use only)

CH1	CH2	CH3	CH4	CH5	CH6
P1	VA1	V1	I1	PF1	PH1
P3	VA3	V3	I3	PF3	PH3
P13	VA13			PF13	PH13
				V1	I1
				V3	I3
				V13	I13
				FREQ	V1
				Var1	PF1
				Var3	PF3
				Var13	PF13

Select from these combinations

Three-phase three-wire configuration (triple-voltage, triple-current; modules for three-phase use only)

CH1	CH2	CH3	CH4	CH5	CH6
P1	VA1	V1	I1	PF1	PH1
P2	VA2	V2	I2	PF2	PH2
P3	VA3	V3	I3	PF3	PH3
P13	VA13			PF13	PH13
				V1	I1
				V2	I2
				V3	I3
				V13	I13
				FREQ	V1
				Var1	PF1
				Var2	PF2
				Var3	PF3
				Var13	PF13

V0	I0	V1	I1	V1	I1
V1	I1	V2	I2	V2	I2
V2	I2	V3	I3	V3	I3
V3	I3				

Select from either of the two groups of combinations

Three-phase four-wire configuration (modules for three-phase use only)

CH1	CH2	CH3	CH4	CH5	CH6
P0	VA0	V1	I1	PF0	PH0
P1	VA1	V2	I2	PF1	PH1
P2	VA2	V3	I3	PF2	PH2
P3	VA3	P0	VA0	PF3	PH3
		P1	VA1	V1	I1
		P2	VA2	V2	I2
		P3	VA3	V3	I3
				FREQ	V1
				Var0	PF0
				Var1	PF1
				Var2	PF2
				Var3	PF3
				P0	VA0
				P1	VA1
				P2	VA2
				P3	VA3

V0	I0	V1	I1	V1	I1
V1	I1	V2	I2	V2	I2
V2	I2	V3	I3	V3	I3
V3	I3				

Select from either of the two groups of combinations

Setting the Span (SPAN)

Set the left and right spans within the limits of an input range. In the SPAN menu item, the left-hand value is the left span and the right-hand value the right span. Set the span within the measuring range. The measurable limits vary depending on the measuring range you select, as shown below.

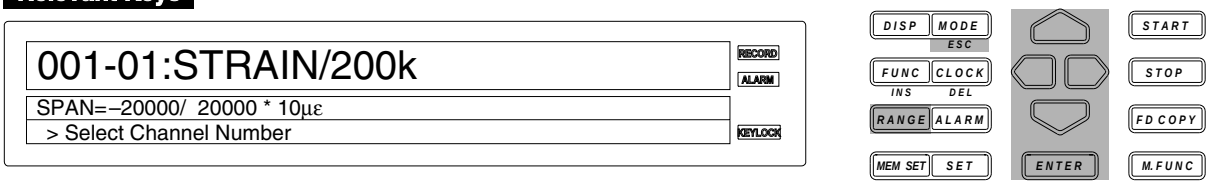
	25V-0.5A	25V-5A	250V-0.5A	250V-5A
Effective voltage Vi (i=1,2,3,13,0)	0.00 to 25.00Vrms	0.00 to 25.00Vrms	0.0 to 250.0Vrms	0.0 to 250.0Vrms
Effective current Ii (i=1,2,3,13,0)	0.0000 to 0.5000Arms	0.000 to 5.000Arms	0.0000 to 0.5000Arms	0.000 to 5.000Arms
Active power P1,P2,P3	–12.50 to 12.50W	–125.0 to 125.0W	–125.0 to 125.0W	–1250 to 1250W
Active power P13	–25.00 to 25.00W	–250.0 to 250.0W	–250.0 to 250.0W	–2500 to 2500W
Active power P0	–37.50 to 37.50W	–375.0 to 375.0W	–375.0 to 375.0W	–3750 to 3750W
Apparent power VA1,VA2,VA3	0.00 to 12.50VA	0.0 to 125.0VA	0.0 to 125.0VA	0 to 1250VA
Apparent power VA13	0.00 to 25.00VA	0.0 to 250.0VA	0.0 to 250.0VA	0 to 2500VA
Apparent power VA0	0.00 to 37.50VA	0.0 to 375.0VA	0.0 to 375.0VA	0 to 3750VA
Reactive power Var1,Var2,Var3	0.00 to 12.50Var	0.0 to 125.0Var	0.0 to 125.0Var	0 to 1250Var
Reactive power Var13	0.00 to 25.00Var	0.0 to 250.0Var	0.0 to 250.0Var	0 to 2500Var
Reactive power Var0	0.00 to 37.50Var	0.0 to 375.0Var	0.0 to 375.0Var	0 to 3750Var
Power factor PFi(i=1,2,3,13,0)	–1.00 to 1.00	–1.00 to 1.00	–1.00 to 1.00	–1.00 to 1.00
Phase PHi(i=1,2,3,13,0)	–80.0 to 80.0deg	–80.0 to 80.0deg	–80.0 to 80.0deg	–80.0 to 80.0deg
Frequency FREQ	45.00 to 65.00Hz	45.00 to 65.00Hz	45.00 to 65.00Hz	45.00 to 65.00Hz

Precautions in Measurement

- Input the voltage or current being measured at a level between 10% and 100% of the measuring range. The instrument bases its calculations of all other parameters on the frequency of V1. Extra care must therefore be taken when setting the input level of V1. If the input level fails to fall within the given limits, there is no guarantee that the measurement of any other parameters will be reliable.

5.4 Configuring the Measuring Range and Span or the Linear Scaling of a Strain Input Channel

Relevant Keys



Operating Procedure

- Press the RANGE key to enter the RANGE menu.
- Using and , select and/or enter a value for each of the shaded fields shown below.
- To exit any of the following menu items during the procedure, press the MODE (ESC) key. This returns to the first item of the menu. Note, however, that your new settings and selections are canceled.
- Reaching the step showing the message "***SET OK***" confirms the latest settings/ selections.

Setting the Measuring Range and Span

(Main menu item)

001-01:STRAIN/200k
>Select Channel No.
↓
001-01:STRAIN/200k
>Select Channel No.
↓
001-01:STRAIN/200k
↓
001-01:STRAIN/200k ENTER
2k 20k 200k
↓
SPAN=–20000/_20000 ENTER
>Span limit(–20000 to 20000*10 με)
↓
SET OK (configuration complete) ESC

Setting Linear Scaling

(Main menu item)

001-01:STRAIN/200k
>Select Channel No.
↓
001-01:STRAIN/200k → **001-01:STRAIN/200k**
>Select Channel No.

/

001-01:SCL:STRAIN/200k (Press twice)
↓
001-01:SCL:STRAIN/200k ENTER
2k 20k 200k
↓
SPAN=–20000/_20000 ENTER
>Span limit(–20000 to 20000 *10με)
↓
SCL=-100.00/_100.00 ENTER
↓
SET OK (configuration complete) ESC

Explanation

Setting the Channel Number

Set the channel number for which you want to configure the type of input, span and so on. In this procedure, determine from which channel (starting channel) to which channel (ending channel) you want to include in your configuration.

Starting Channel Number

The first three digits on the main display constitute the starting channel number.

- The first digit is the unit number. The second digit denotes the module number (slot number).
- The configurable range depends on the location where the power monitor module is connected. A strain input module takes up twice the space of a standard-size module. This results in the number of the slot following the one where the strain input module is installed being a missing number. See page 3-8 for more information.

Ending Channel Number

The two digits that follow the starting channel number constitute the ending channel number.

- For the configurable range, see "Starting Channel Number" above.
- You cannot enter a channel number that is smaller than the starting channel number.
- If you have entered the same number as the starting channel number, only that one particular channel is included in your configuration (configuration of the type of input, span, etc.).
- When you move the cursor from the starting to the ending channel number, the ending channel number becomes the same as the last two digits of the starting channel number.

Measurement Mode

The measurement mode should be 2 k, 20 k, or 200 k. The measuring ranges are as shown below depending on the measurement modes and gauge methods.

Gauge method	2 k	20 k	200 k
1-gauge method	-2000 to 2000 με	-20000 to 20000 με	-200000 to 200000 με
2-gauge method	-1000 to 1000 με	-10000 to 10000 με	-100000 to 100000 με
4-gauge method	-500 to 500 με	-5000 to 5000 με	-50000 to 50000 με

Setting the Span (SPAN)

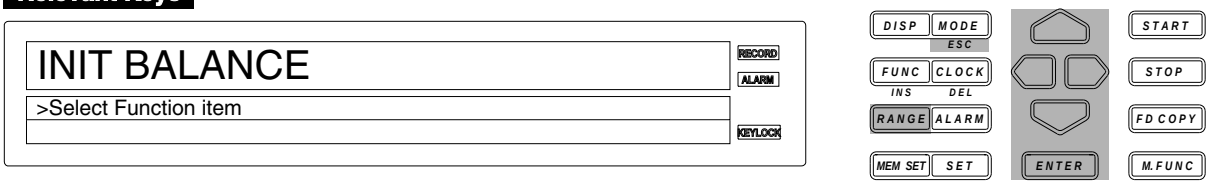
Set the left and right spans within the limits of the input range. In the SPAN menu item, the left-hand value is the left span and the right-hand value the right span.

Note

If you have connected any new strain gauge or changed the measuring range (initialization of settings or reconfiguration of the system also changes the measuring range back to its default), you must go through initial balancing. See Section 5.5, "Performing Initial Balancing/Initialization on a Strain Input Channel," for more information.

5.5 Performing Initial Balancing/Initialization on a Strain Input Channel

Relevant Keys



Operating Procedure

- Press the FUNC key to enter the FUNC menu.
- Using ⌂⌄ and , select and/or enter a value for each of the shaded fields shown below.
- To exit any of the following menu items during the procedure, press the MODE (ESC) key. This returns to the first item of the menu. Note, however, that your new settings and selections are canceled.
- If you have made changes to any item executable with the FUNC key, information on initial balancing may not appear on the display.

Performing Initial Balancing

(Main menu item)

ALARM ACK

⌂/⌄

INIT_BALANCE [ENTER] → **BALANCE CH=001-010** [ENTER]

>Select Channel No.

↓

BALANCE MODE = EXEC [ENTER]

ABORT EXEC INIT

↓

Balancing... *

↓

> CHANNEL = 001-60 [ENTER] ——→ **(Operating status)**

>OK■ 001■■■■■■■■■■ □□□□□□□□□□

>OK■ 031 □□□□□□□□□□

Initializing the Strain Input Channels

(Main menu item)

ALARM ACK

⌂/⌄

INIT_BALANCE [ENTER] → **BALANCE CH=001-010** [ENTER]

>Select Channel No.

↓

BALANCE MODE = INIT [ENTER] → **(Operating status)**

ABORT EXEC INIT

Indication of the Status of Initial Balancing

If you have performed initial balancing, the instrument shows whether the initial balancing is successful or not in the following format. Using the ⌂⌄ keys, you can change the unit number for which you want the status shown.

> CHANNEL = 001-60

>OK■ 001■■■■■■■■■■ □□□□□□□□□□

>OK■ 031 □□□□□□□□□□

Starting channel

Module-by-module status indication

■ : successful end of initial balancing

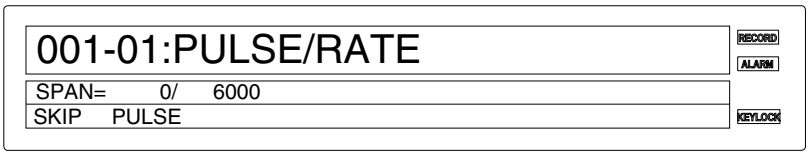
□ : unsuccessful end of initial balancing

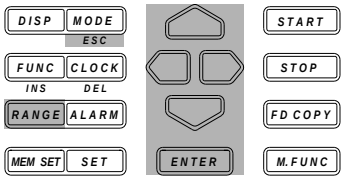
Note

- This function is disabled during making a report.
- The following operations are stopped when this function is performed.
  - Saving data to the memory
  - Computing

5.6 Configuring the Pulse Input Channel

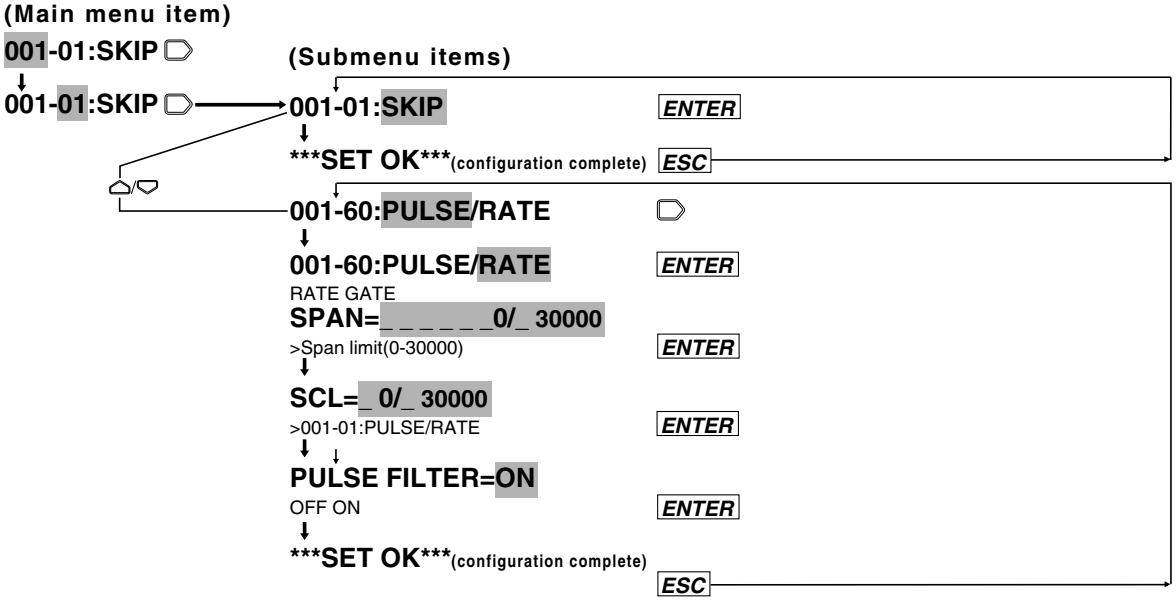
Relevant Keys





Operating Procedure

- Press the RANGE key to enter the RANGE menu.
- Using and , select and/or enter a value for each of the shaded fields shown below.
- To exit any of the following menu items during the procedure, press the MODE (ESC) key. This returns to the first item of the menu. Note, however, that your new settings and selections are canceled.
- Reaching the step showing the message "***SET OK***" confirms the latest settings/ selections.



Explanation

Types of Input

- Pulse Input Measurement (PULSE)
  Select this option when measuring pulse input.
- Skip (SKIP)
  No measurement is done.

Measurement Mode

Select the mode used in pulse input measurement. Use the computing function when summing the count or turn-on time over a given period of time.

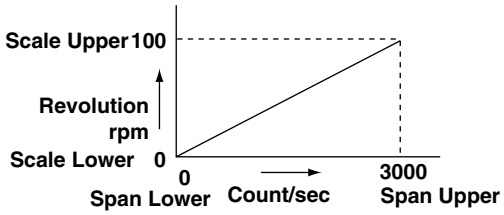
- Instantaneous Count Mode (RATE)
  Select this option when determining the count for one second.
- Instantaneous Turn-on Time Mode (GATE)
  Select this option when detecting the on/off states by means of variations in the instantaneous value every second.

Span (SPAN)

Set the upper and lower limits of the pulse count and turn-on time. The maximum configurable value is 30000.

Scale (SCL)

Configure this menu item when converting the scale values to those of a system of units suited for your purpose. The maximum configurable range is 0-30000, excluding the decimal point.



Filter On/Off (PULSE FILTER)

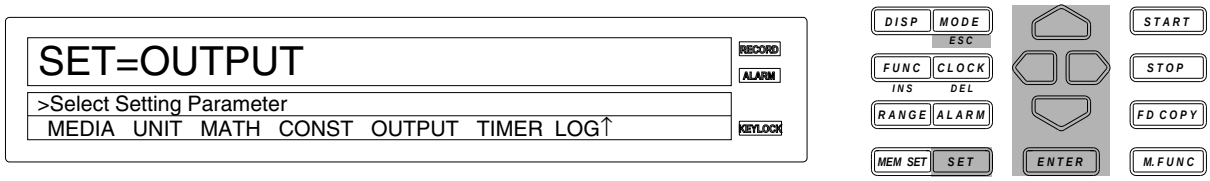
Set this menu item to ON when eliminating chatter (up to 5 ms).

Unit (UNIT)

Configure this menu item when assigning a unit to the measured value. See Section 8.3, “Setting the Engineering Unit” (on page 8-5) for more information on how to assign the unit.

5.7 Assigning the measurement/computation channel or communication input channel to be output to the retransmission terminal

Relevant Keys



Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set ▭ using the ◠ ◡ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear. However, the new settings/selections are canceled.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET= ▭

(Lower menu)

OUTPUT — *ENTER* → **001:CH=**_ _ _ _ _ _

>Select Channel No.

↓

001:CH=_ _ _ _

>OFF 0 1 2 3 4 5 A C

↓

*****SET OK***** (End of setting)

▷ **Select the retransmission terminal number**

ENTER **Set the measurement/ computation/communication input channel**

ESC → back to OUTPUT

Explanation

- **Retransmission terminal number**

  Set the number of the terminal that will enable the retransmission.
- **Channel number**

  Set the measurement/computation/communication input channel number that will be output from the retransmission terminal.

OFF	Retransmission disabled.
001 to 560	Measurement channel (001 to 060 for standalone type)
AXX	Computation channel
CXX	Communication input channel

Note

- If the retransmission module is not detected, the "OUTPUT" items are not displayed. After setting the retransmission, if the retransmission module is no longer detected during system configuration, the retransmission is turned OFF.
- Measurement channels that are not detected by system configuration cannot be specified. After setting the retransmission, if the measurement channel specified during system configuration is no longer detected, the retransmission is turned OFF.
- The retransmission module outputs 0 V or 0 mA in the following cases:
  - When the retransmission is turned OFF.
  - Immediately after turning on the power.
  - While displaying the setup menu.
  - During calibration mode (excludes when the retransmission module is being calibrated).
  - During initial balancing of the strain input module.
  - Immediately after changing the measurement range or the wiring of the measurement channel being retransmitted.
- If a measurement dropout occurs due to the load such as the number of modules that are connected, the computational expression of the computation option, and the external storage medium, the output value of the retransmission does not change.
- For setting the retransmission filter, see section 10.3.

6.1 Starting/Stopping the Writing of Data

Relevant Keys

Starting/Restarting Writing

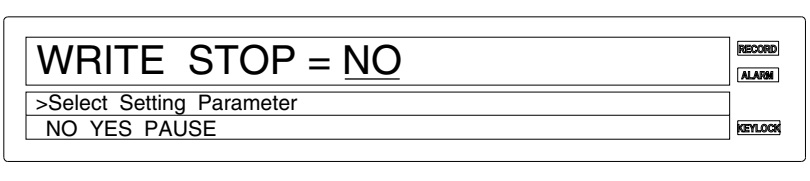
START

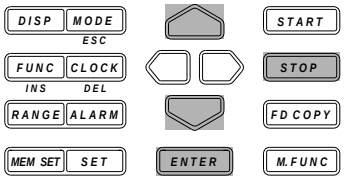
Operating Procedure

- Press the START key to start writing the measured or computed data.

Relevant Keys

Stopping/Suspending Writing





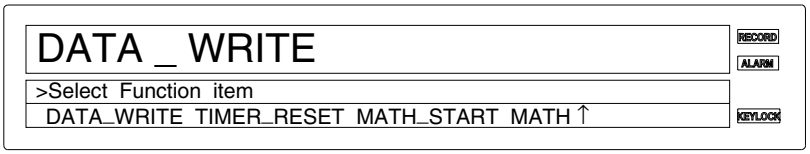
Operating Procedure

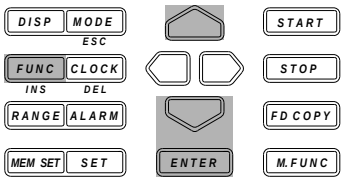
- Press the STOP key to enter the STOP menu.
- Select / set using the keys.

(Main menu)
WRITE STOP=YES ENTER
>Select Setting Parameter
NO YES PAUSE
↓
Monitor Mode

Relevant Keys

Writing Measured/Computed Data for One Scan





Operating Procedure

- Press the FUNC key to enter the FUNC menu.
- To display the FUNC menu from the RANGE/ALARM/MEM SET/SET (SET3) menu, press the DISP key and enter the Monitor Mode Display.

(Main menu)

DATA WRITE ENTER ⟶ **Monitor Mode**

Explanation

Starting writing (WRITE START)

In case of the measured/computed data, if WRITE TRIG is FREE, this opens a file and starts writing. If writing has been suspended, it restarts writing. If WRITE TRIG is set to TRIG, it is ready for a trigger.

- When writing measured/computed data and periodic file or writing measured/computed data and report file on the DC100 with the report option, the two files are written simultaneously.
- When measured/computed data, report data or periodic file writing is started, the word RECORD indicating the status in the display is lit.
- For the writing operation, see Section 6.2, "Setting a Writing Channel or Writing Operation."
- Writing can also be started using the event/action function. For an example of an event/action setting, see Section 6.3, "Starting the Writing Using Event or Action Functions" (page 6-9).

Stopping/Suspending Writing (WRITE STOP)

- Select whether to stop/suspend writing or not.
  - YES: This closes a file and stops writing.
  - PAUSE: This suspends writing. The file remains open.
  - NO: This does not stop/suspend writing.
- By selecting YES and pressing the ENTER key, writing is stopped. The word RECORD indicating the status in the display goes off.
- By selecting PAUSE and pressing the ENTER key, writing is suspended. The word RECORD indicating the status in the display remains lit.
- Writing can also be suspended/restarted using the event/action function. If PAUSE is set as a level action for alarm, relay, or remote events using the event/action function, suspension/restarting through a key operation cannot be done.
- "PAUSE" is available for the measured/computed data and the peridic file.

Writing Data for One Scan

- A measured data item for one scan (one per channel) retained when the ENTER key is pressed is written in the measured/computed file.
- This operates separately from the writing period.
- This can also be executed using the event/action function.
- This function is available for the measured/computed data.

Display During Data Writing

One of the following statuses is displayed in sub-display 2 (the lowest line of the display part).

1: Writing measured/computed data files only.

2: Writing periodic file or report file only.

A: Writing measured/computed data file and periodic file or measured/computed data file and report file.

P: Writing paused

B: Binary copying

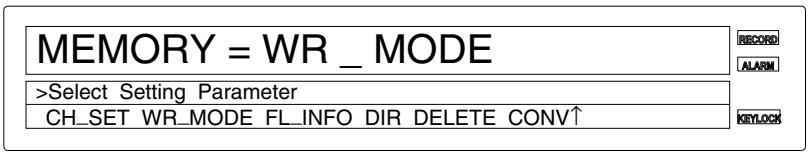
Restriction During Data Writing

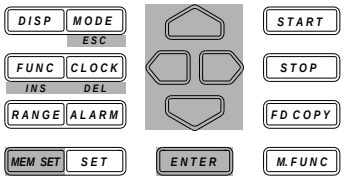
The following settings cannot be made during data writing:

- All media source settings except for stopping/suspending writing.
- Saving/reading set data
- Measuring range
- Computation expression/constants
- Group
- Inter-channel copying
- Media source settings as actions for the event/action function

6.2 Setting a Writing Channel or Writing Operation

Relevant Keys

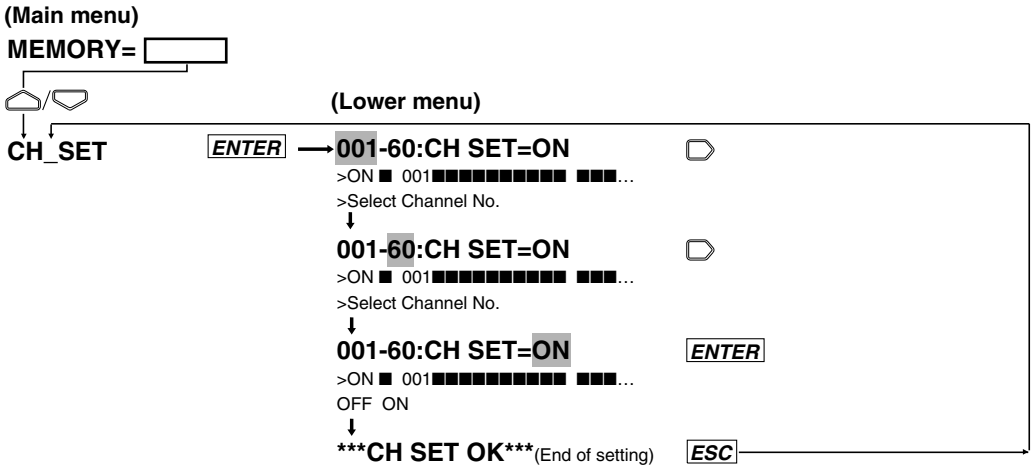




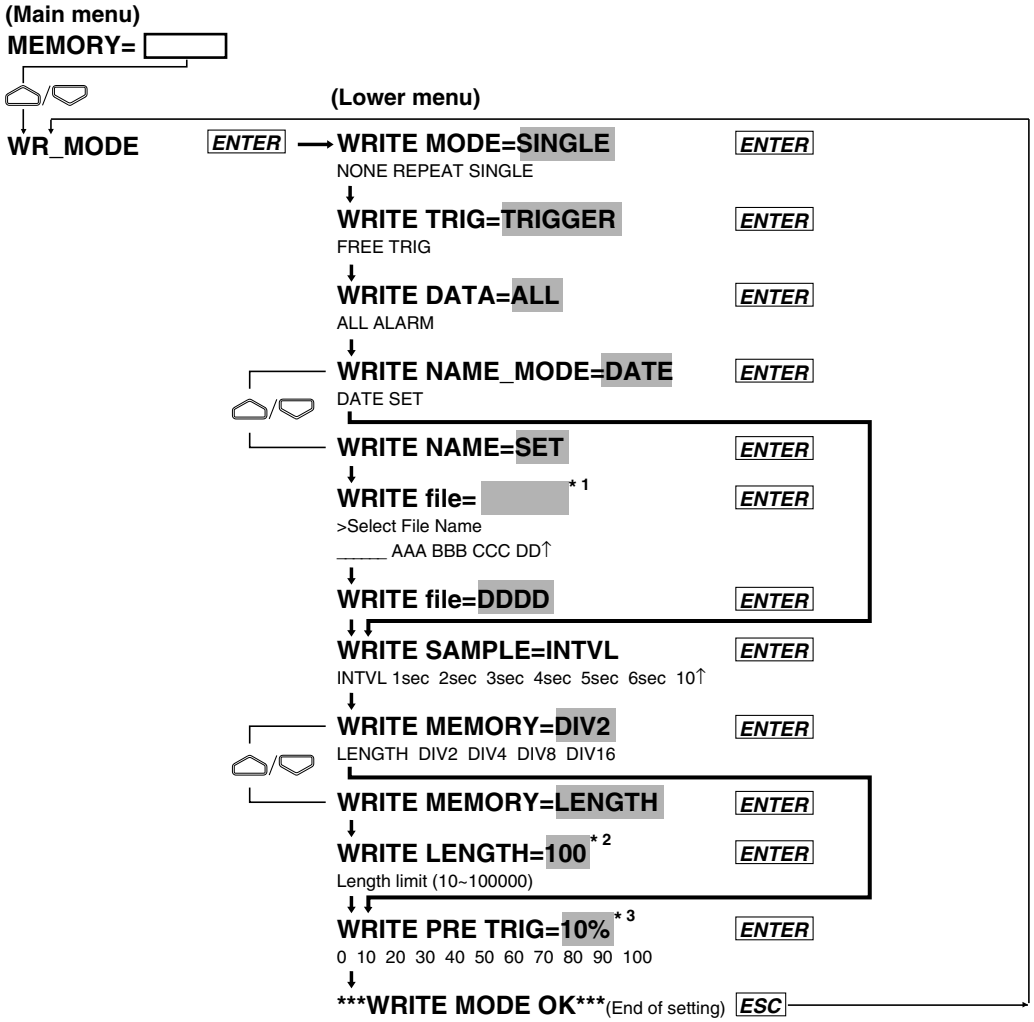
Operating Procedure

- Press the MEM SET key to enter the MEM SET menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the "MODE (ESC)" key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

Selecting a Writing Channel



Setting the Writing Operation



*1 Displays only when NAME_MODE is set to SET.
*2 Displays only when WRITE MEMORY is set to LENGTH.
*3 Displays only when WRITE TRIG is set to TRIGGER.

Explanation

Selection of Channel to Be Written (CH SET)

This selects whether to write measured/computed data or not for each channel. Channel numbers A01 to A60 indicate the channels for computation (optional).

- OFF: No writing is done.
- ON: Writing is done.
- Default is ON.

Writing Operation Setting (WRITE MODE)

Select the writing operation of the measured/computed data from the following:

- NONE: Displayed only when the /M3 option is installed. Use this mode when saving only report data or periodic files. The entire built-in RAM disk is used for saving these files.
  If there are files saved on the built-in RAM disk, you cannot change the operation from NONE to SINGLE or REPEAT or visa versa.
- SINGLE: Data for only one file are written and then the writing operation is terminated.
- REPEAT: After writing data for one file is completed, the next file is created and writing starts. When the built-in RAM disk becomes full, the writing operation is terminated. However, if the WRITE MEMORY setting is DIV□, when the built-in RAM disk becomes full, the file with the oldest date and time is deleted and new data items can also be continued to be written by setting FILE ROTATE to ON in the SETUP mode.
- Default setting is REPEAT.

Use of Trigger (WRITE TRIG)

Writing can be set to be started when an event (trigger) is generated.

- TRIGGER: Writing starts at the generation of an event (trigger) using the event/action function (trigger mode).
- FREE: Writing starts when the START key is pressed.
- Default setting is FREE.

Note

If data are written using TRIG, the saving operation is also required to start using the START key or through the event/action function.

Selection of Writing Data (WRITE DATA)

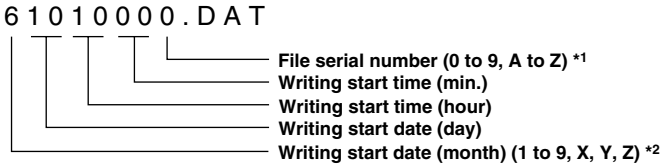
Select the data to be written from the following:

- ALL: All measured/computed data are written.
- ALARM: Measured/computed data in all channels are written only when an alarm is generated.
- Default setting is ALL.

Setting of File Name (WRITE NAME)

- Select the specifying method of a file name from the following:
  - DATE: Automatically set based on the date.
  - SET: Freely set by the user (up to 5 characters).
  - Default setting is DATE.
- When DATE is selected, the file name is set automatically in the following form.

Form of file name (at automatic setting)



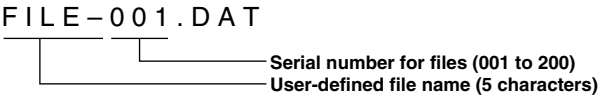
*1: The serial number follows with A to Z after 0 to 9 and returns to 0 after Z.
*2: X, Y, and Z represent October, November, and December respectively.

- When SET is selected, the user can freely set the first 5 characters. Characters that can be used for file names are only those that can be selected from the display. In addition, no blank spaces are allowed.

Note

If "DATE" is selected as file name setting (WRITE NAME), the 'writing start time' as can be determined form the file name, may differ one minute form the actual writing start time.

File name format (when specified by the user.)



- Serial file numbers are automatically changed only when writing is done continuously with the same name.
- If a file with serial number 200 exists during writing in the SINGLE mode, this serial file number is not automatically changed. Rather, the file is given a name with serial number 001.
- If the same file names exist, whether to employ overwriting or to end writing can be set in the SET UP menu.

Writing Period

- The period in which data are written can be selected from the following:
  - INTVL: The same as the measuring period. Measured/computed data are saved without thinning-out.
  - 1 sec, 2 sec, 3 sec, 4 sec, 5 sec, 6 sec, 10 sec, 12 sec, 15 sec, 20 sec, 30 sec, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 30 min, or 60 min: Writing is done with the set period. However, only those values which are multiples of the measuring period can be selected.
  - LOGIC: Only effective if event/action is set to action "DATA_WR." Every time an event is generated, the data item for one scan (one for each channel) is written. For the event/action, see Section 9.1, "Setting Event/Action Functions" (page 9-1).
  - Default setting is INTVL.
- If the computation channel is used, missing computation measurements may occur depending on the number of computation expressions or measuring period. If the computation measurement missing status is displayed, make the measuring period longer or decrease the computation expressions.
- When the measuring period is changed, the writing period will not equal the measuring period or its integral multiples, and is subsequently adjusted to equate with the measuring period.

Built-in RAM Disk Usage (WRITE MEMORY)

- Select the built-in RAM disk usage from the following:
  - LENGTH: Determine the file capacity by specifying the number of data items per channel.
  - DIV2, DIV4, DIV8, or DIV16: Use the RAM disk by dividing the disk area into 2, 4, 8 or 16 parts. If the memory capacity is 4 MB, 2 cannot be used.
- If a file is saved in the built-in RAM disk, the usage of the built-in RAM disk cannot be changed. For this purpose, initialize the RAM disk or change the setting after deleting all the files. In that case, necessary files must be saved on a floppy disk.

Writing Data Length (WRITE LENGTH)

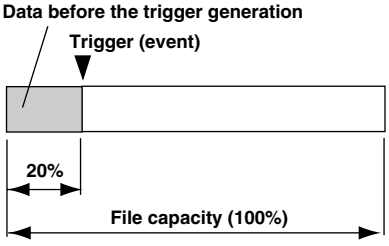
- If WRITE MEMORY is set to LENGTH, set the number of data items to be written per channel.
- However, a data length exceeding a file size of 1 MB cannot be selected depending on the number of channels.
- After starting writing, even if the writing is stopped before the specified data length is reached, the file capacity is taken by the area for the specified data length.

Note

- When using the computation channel, do not write measured/computed data in an application where the measurement interval is shorter than 0.5 sec, the writing interval is set to INTVL, or the data length is shorter than 50, if:
  • the writing action is in the REPEAT mode.
- Doing so may result in incorrect writing.
- When the Writing operation is set to REPEAT and there is not enough space to create a new file on the internal RAM disk, the files are deleted in order form the oldest file to create the new file. If the necessary space to create the new file cannot be allocated after deleting the five oldest files, the writing operation stops.
- If there are a lot of files on the internal RAM disk, file switching takes time. In some cases, this causes drop outs in the writing operation. In this case, delete unnecessary files form the RAM disk or increase the measurement interval.

Pretrigger (WRITE PRETRIG)

- If WRITE TRIG is set to TRIGGER, the data before the trigger (event) generation can be saved in part of the set file. Setting is done as a percentage of the file capacity in 10% increments.



- If a pretrigger is used (except 0%), it is necessary to set the writing start trigger (WR_TRIG) to the action in the event/action function.

Data Format

The measured/computed data are saved in the binary format.

Data Capacity

The data capacity is determined by the following formula.

Measured data: 2 bytes/data item

Computed data: 4 bytes/data item

For stand-alone model:

Header 256 + 64 × (number of measuring channels + number of computing channels) bytes

Data capacity = 256 + 64 × (number of measuring channels + number of computing channels) + (number of measuring channels × 2 + number of computing channels × 4 + 6) × data length

For expandable model:

Header 576 + 64 × (number of measuring channels + number of computing channels) bytes

Data capacity = 576 + 64 × (number of measuring channels + number of computing channels) + (number of measuring channels × 2 + number of computing channels × 4 + 6) × data length

For example, in the case of a stand-alone model, if the number of measuring channels = 10, number of computing channels = 5, data length = 5k, the data capacity is as follows:

Data capacity = 256 + 64 × (10 + 5) + (10 × 2 + 5 × 4 + 6) × 5k = 231216 bytes

Since the data is saved to the built-in RAM disk in units of 1024 bytes, the actual capacity used is 231424 bytes.

Measuring Time for Each File

The summary of the measuring time for each file is shown below.

Stand-alone Type Number of measuring CH: 30 Computing CH: OFF

Built-in RAM disk capacity		1037312 bytes	2084864 bytes	4178944 bytes
Number of partitions on the built-in RAM disk		2	2	4
Data length		7817 Data	15761 Data	15792 Data
File size		518098 bytes	1042402 bytes	1044448 bytes
Measuring time	Measuring period 0.5 s	1 hr 5 min 8 s	2 hr 11 min 20 s	2 hr 11 min 36 s
	Measuring period 2 s	4 hr 20 min 32 s	8 hr 45 min 20 s	8 hr 46 min 22 s
	Measuring period 30 s	65 hr 8 min 0s	5 day 11 hr 20 min 0 s	5 day 11 hr 35 min 30 s
	Measuring period 60 min	325 day 16 hr 0 min 0 s	656 day 16 hr 0 min 0 s	659 day 23 hr 0 min 0 s

File size = 256 + 64 × number of measuring channels + (2 × number of measuring channels + 6) × data length

Extended Type Number of measuring CH: 300 Computing CH: OFF

Built-in RAM disk capacity		1037312 bytes	2084864 bytes	4178944 bytes
Number of partitions on the built-in RAM disk		2	2	4
Data length		822 Data	1687 Data	1630 Data
File size		517908 bytes	1042098 bytes	1043916 bytes
Measuring time	Measuring period 0.5 s	6 min 51 s	14 min 3 s	14 min 5 s
	Measuring period 2 s	27 min 22 s	56 min 12 s	56 min 18 s
	Measuring period 30 s	6 hr 50 min 30 s	14 hr 3 min 0 s	14 hr 4 min 30 s
	Measuring period 60 min	34 day 5 hr 0 min 0 s	70 day 6 hr 0 min 0 s	70 day 9 hr 0 min 0 s

File size = 576 + 64 × number of measuring channels + (2 × number of measuring channels + 6) × data length

Example of setting when measured data are saved continuously

Measured data are continuously saved.

Operation flow:

1. Set file cancellation to be executed when copying files in the SET UP menu.
   (Power ON + DISP key) enters the SET UP menu.
   "MEM SET" in SET UP menu — FILE COPY & DELETE = ON
   Terminate SET UP menu. — END = STORE

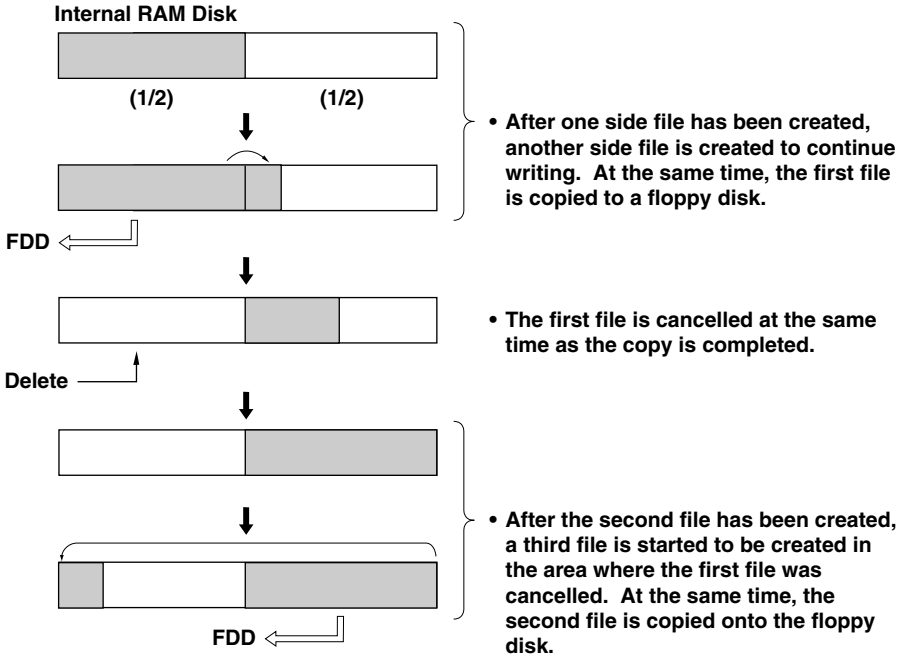
2. Set to execute copying when the file is ended in the event/action setting.
   "LOGIC" in SET menu — LOGIC BOX No.
   EVENT = FILE_END
   ACT = EDGE/MEMRY:CP_FDD

3. Set the writing operation.
   "WRITE MODE" in MEM SET menu — WRITE MODE = REPEAT
   WRITE TRIG = FREE
   WRITE DATA = ALL
   WRITE NAME = DATE
   WRITE MEMORY = DIV2

4. Start by pressing the START key.

- Either step 2 or step 3 of the setting operation can follow step 1.

Operation flow:



6.3 Starting Writing Using Event or Action Functions

Flow of operation

A flow of the operation will be shown taking the case where measured/computed data are automatically saved every time an alarm is generated.

1. Select the writing channel.

Menu Item	Setting
"CH SET" in MEM SET menu	001-01: CH SET=ON (Allowed to set the consecutive numbers of channels)

2. Set the writing operation.
   In this case, set the writing so that data before an alarm generation are acquired within 30 % of the file capacity.

Menu Item	Setting
"WRITE MODE" in MEM SET menu	WRITE MODE=REPEAT WRITE TRIG=TRIGGER WRITE DATA=ALL WRITE NAME=DATE WRITE MEMORY=LENGTH WRITE LENGTH=1 k WRITE PRE TRIG=30 %

3. Set an event/action.

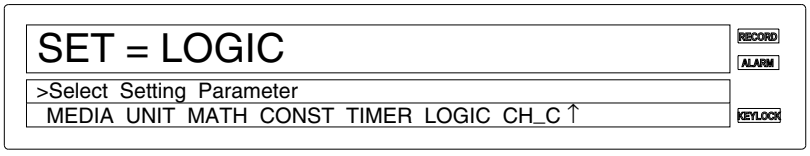
Menu Item	Setting
"LOGIC" in SET menu	LOGIC BOX No. EVENT=ALARM ACT=EDGE/MEMORY : WR_TRIG

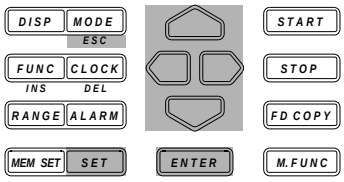
4. Obtain the status ready for trigger by pressing the START key.
   Subsequently, the operation to write measured/computed data at every alarm generation can be repeated for the number of files in the RAM disk.

See Section 6.2 for the settings of 1 and 2, and see the next page for the setting of 3. Also, see Section 6.1 for the operation of 4.

Example of Event/Action Setting

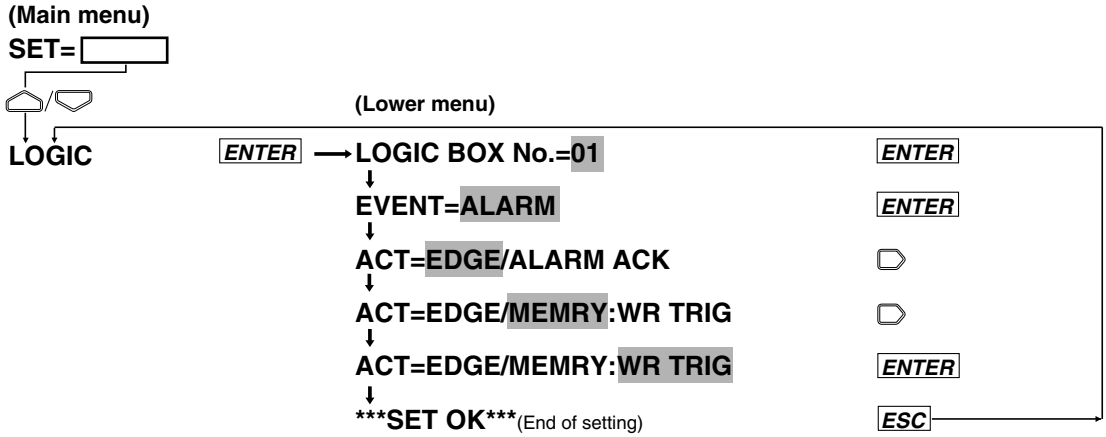
Relevant Keys





Operating Procedure

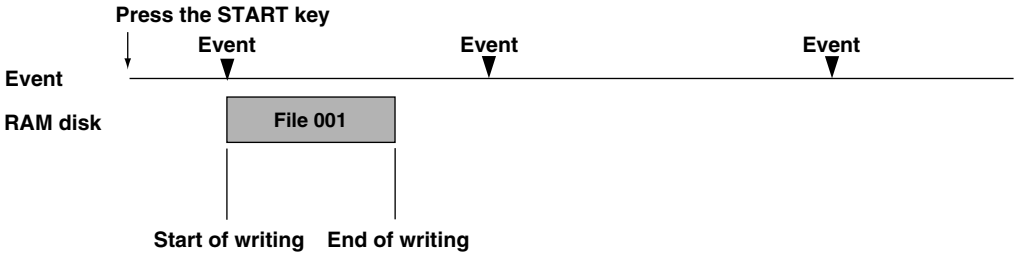
- Press the SET key to enter the SET menu.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.



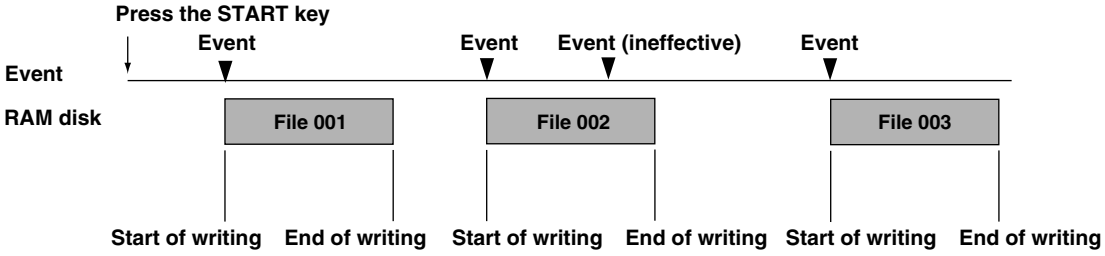
Explanation

Writing Operation Using Event/Action Function

When SINGLE is selected as WRITE MODE:



When REPEAT is selected as WRITE MODE:

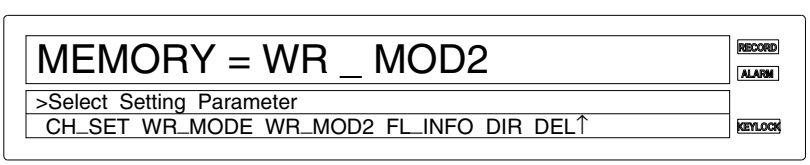


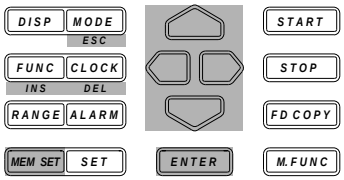
Key Operation When Event/Action Function is Used

If a writing start (START) or writing starting trigger (WR_TRIG) is set to an action, it is necessary that the status ready for a trigger (event) is reached using the START key or set writing start (START) to the action after setting.

6.4 Setting Writing Operation of Periodic File/ Report Data

Relevant Keys

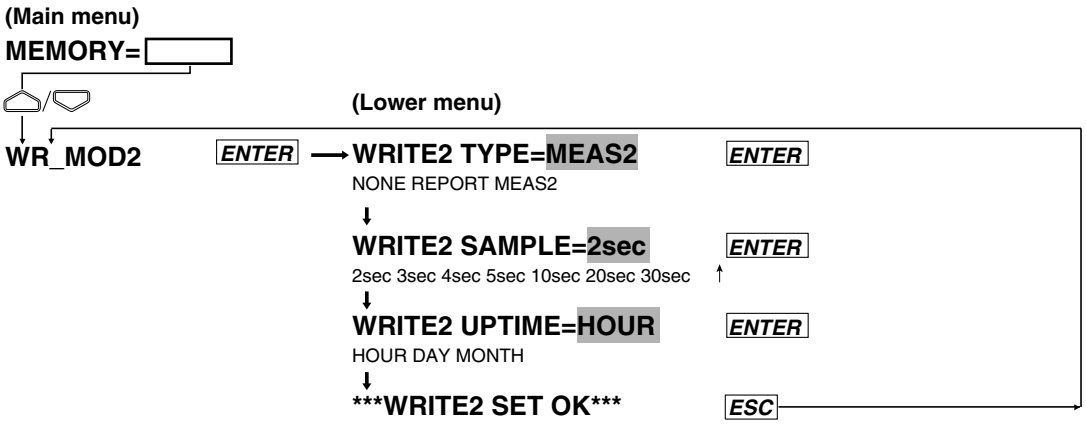




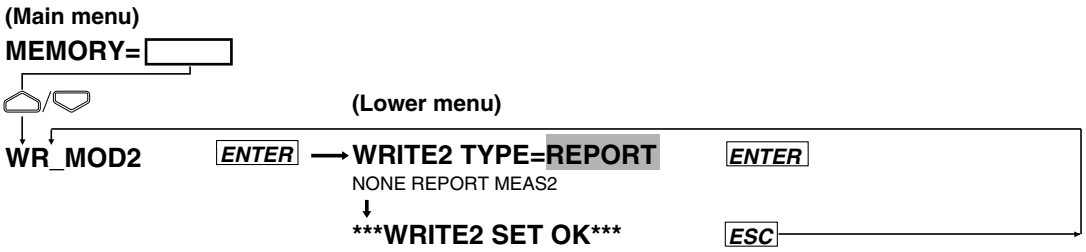
Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

Periodic file



Report file



Explanation

Channels for Writing Periodic Files

Channels for writing periodic files are the same as the channels for writing measured/computed data. See Section 6.2, "Setting Writing Operation of Periodic File/Report Data."

File Types (WRITE2 TYPE)

Select from the following:

NONE: Does not save either the report file or the periodic file.
REPORT: Saves the report file.
MEAS2: Saves the periodic file.

If there are files saved on the built-in RAM disk, you cannot change the file type.

Note

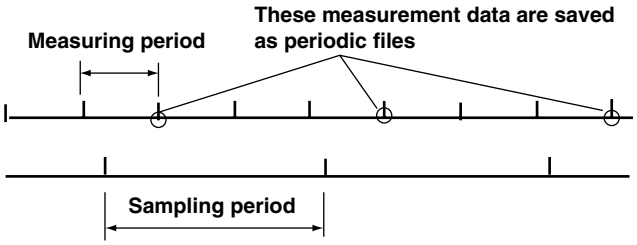
- There are no file alarm function for periodic and report files.
- There are no functions for writing the data over 1 scan for periodic and report files.
- Report files cannot be converted to ASCII and copied. Use the separately sold application software, DP38011, for this purpose.
- SINGLE mode (terminate after writing one file) is not available for periodic and report files.
- There are no pretrigger functions for periodic files.
- You cannot pause while writing the report file.

Report File

The type of report file and the date and time to create the report are set with the setup mode. See Section 10.11, "Setting Conditions for Creating Reports."

Sampling period (SAMPLE)

You can select a sampling period from the following list. The sampling period you select must be an integer multiple of the measuring period.
2 sec, 3 sec, 4 sec, 5 sec, 10 sec, 20 sec, 30 sec, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 20 min, 30 min, 60 min
If the sampling period is not an integer multiple of the measuring period after changing the measuring period, the writing period is automatically changed to 1 min.
If the sampling period and measuring period are not synchronized, the measured data immediately following the specified time for saving to the periodic file, are saved.



Up Time (UP TIME)

Sets the time for creating the files.

HOUR: Create files on the hour (measured data over an hour).
DAY: Create files at the specified time every day (measured data over a day). The time of creation is the same as the time for creating daily report.
MONTH: Create files at the specified time every month (measured data over a month). The date and time of creation is the same as the date and time for creating monthly report.

For the setting procedure, see section 10.12, "Setting Conditions for Creating Reports."

Conditions to Start Writing Data

Pressing the START key starts the writing.

- If the measured/computed data are to be written, writing also starts for these data.
- For a report file, writing does not start unless the report operation is in the start condition. Start the report operation at the screen that appears when the "FUNC" key is pressed or by setting "REPORT START" in the action of the event/action function.
- You can also start writing with the event/action function. For details, see section 9.1 "Setting Event/Action Functions."

Note

- Writing of periodic file sometimes fails, if the start, stop and restart operations of the periodic file are all executed within one minute. Execute these operations so that each operation do not fall within the same minute.
- Since the first periodic or report file saves the data from the time the writing started to the first date and time for creating the periodic/report file, the data length may be shorter than the designated length.

Copy

Periodic files can be converted to ASCII format when copying the data from the built-in RAM disk to the floppy disk or MO/ZIP/PD disk.

Writing Method

Periodic files and report files are created until the built-in RAM disk becomes full. You can also have the old files be overwritten with new files with the SET UP mode setting. For report files, the oldest file is deleted.
If deleting the oldest file does not free enough space for the new file, the next oldest file is deleted. If deleting the five oldest files does not free enough space for the new file, the writing is aborted.

Note

For periodic files, sometimes new files cannot be written after changing the conditions for writing the periodic files when old files are present in the built-in RAM disk. In this case, copy the remaining periodic files to the disk and delete them from the RAM disk.

File Name

Periodic file
The file names of periodic files are set automatically as follows.
MddhhmmZ.DAS

M: Month (1 to 9, X, Y, and Z. X, Y, and Z stand for October, November, and December, respectively.)
dd: day (1 to 31)
hh: hour (0 to 23)
mm: minute (0 to 59)
Z: Fixed to Z.

Report file
The file names of report files are set automatically as follows.
Hourly report file: yymddhhn.RBI
Daily report file: Dyymddn.RBI
Monthly report file: Myymn.RBI

- yy: year (00 to 99)
- dd: day (1 to 31)
- hh: hour (0 to 23)
- D: Fixed to D for daily reports.
- M: Fixed to M for monthly reports.
- n: character (0 to 9, A to W)

Note

The format of periodic files are the same as that of the measured/computed data files. The files can be analyzed in the same way as the measured/computed data files.

File Size

Report file
The file sizes are as follows.

File Type	File Size	Area Used on Built-in RAM Disk
Hourly report	3634 Bytes	4096 Bytes
Daily report (standard)	3634 Bytes	4096 Bytes
Daily report (extended)	15346 Bytes	15360 Bytes
Monthly report (standard)	3634 Bytes	4096 Bytes
Monthly report (extended)	18762 Bytes	19456 Bytes

Periodic file
The file sizes of periodic files are shown on the next page.

Maximum Number of Channels for Periodic Files

Stand-alone Type Measured/Computed data also saved simultaneously ROTATE: ON Computing Channel: OFF

Built-in RAM disk capacity			1 M bytes			2 M bytes			4 M bytes		
Maximum file size			259328 bytes			521216 bytes			1044736 bytes		
Sampling period			2 sec	1 min	10 min	2 sec	1 min	10 min	2 sec	1 min	10 min
Up time	1 HOUR	Number of channels that can be saved File size	30 120976 bytes	30 6136 bytes	30 2572 bytes	30 120976 bytes	30 6136 bytes	30 2572 bytes	30 120976 bytes	30 6136 bytes	30 2572 bytes
	1 DAY	Number of channels that can be saved File size	N/A	30 97216 bytes	30 11680 bytes	3 518848 bytes	30 97216 bytes	30 11680 bytes	9 1037632 bytes	30 97216 bytes	30 11680 bytes
	1 MONTH	Number of channels that can be saved File size	N/A	N/A	25 251840 bytes	N/A	2 446784 bytes	30 296800 bytes	N/A	8 982848 bytes	30 296800 bytes

File size = 256 + 64 × number of measuring channels + (2 × number of measuring channels + 6) × (up time/sampling period)

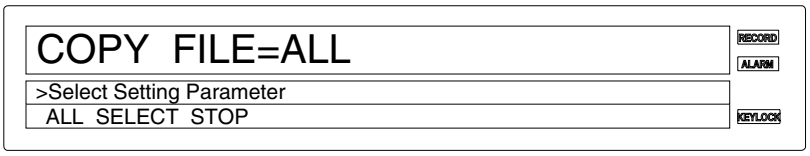
Extended Type Measured/Computed data also saved simultaneously ROTATE: ON Computing Channel: OFF

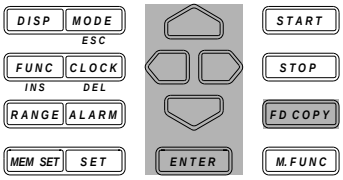
Built-in RAM disk capacity			1 M bytes			2 M bytes			4 M bytes		
Maximum file size			259328 bytes			521216 bytes			1044736 bytes		
Sampling period			2 sec	1 min	10 min	2 sec	1 min	10 min	2 sec	1 min	10 min
Up time	1 HOUR	Number of channels that can be saved File size	67 256864 bytes	300 56136 bytes	300 23412 bytes	139 520672 bytes	300 56136 bytes	300 23412 bytes	282 1044624 bytes	300 56136 bytes	300 23412 bytes
	1 DAY	Number of channels that can be saved File size	N/A	84 256512 bytes	300 107040 bytes	3 519168 bytes	173 518528 bytes	300 107040 bytes	9 1037952 bytes	300 892416 bytes	300 107040 bytes
	1 MONTH	Number of channels that can be saved File size	N/A	N/A	25 251260 bytes	N/A	2 447104 bytes	54 512928 bytes	N/A	8 983168 bytes	113 1043456 bytes

File size = 576 + 64 × number of measuring channels + (2 × number of measuring channels + 6) × (up time/sampling period)

7.1 Copying a Data File

Relevant Keys





Operating Procedure

- Press the FD COPY key to enter the FD COPY menu.
- Select/set ▭ using the △▽ keys.

(Main menu)

(A CODE NUMBER= ▭)*1(ENTER)

↓

COPY MODE=ALL ENTER

ALL SELECT REPORT STOP

↓

Operating status

△/▽

COPY MODE=SELECT ENTER

↓

COPY FILE=AAA ENTER

AAA BBB CCC DDD ↑

↓

COPY DRIVE=FLOPPY*2 ENTER

FLOPPY SCSI0 SCSI1 SCSI2 SCSI3

SCSI4 SCSI5 SCSI6 SCSI7

↓

Operating status

*1 Displayed when copy lock is set at the SET UP menu.
*2 Displayed when the SCSI option (/C5) is installed.

Explanation

Copies measured/computed data, periodic files, and report files from the built-in RAM disk to the floppy, MO/ZIP/PD disk. The extension for measured/computed data file is .DAT. The extensions for periodic file and report file are .DAS and .RBI, respectively.

Copying to the Floppy, MO/ZIP/PD Disk

- Select either to copy all the files or only the specified files.
  - ALL: Copies all files.
    If a file with the same file name already existon the floppy disk or the SCSI device, it is not copied.
  - SELECT: Copies one measured/computed data file or periodic file.
    If there is a file with the same name in the copying destination, overwriting is done on the existing file.
  - REPORT: Copies one report file.
    If there is a file with the same name in the copying destination, overwriting is done on the existing file.
- When copying, the file name cannot be changed.
- If the floppy disk or SCSI device capacity is nearly reached while copying all files, “Change Media *”appears in the main display. In such a case, copying can be continued by inserting a new floppy disk or SCSI device and pressing any key.
- If “Change Media *” is displayed while copying to the SCSI device, inserting a new SCSI device and pressing any key will copy the entire file to the new SCSI device. The old device will contain the file that was partially copied.
- Whether the file in the copying source is cancelled or not after copying can be set in the SET UP menu.
- By setting “FILE_END” to the event and “CP_FDD” or “CP_SCS0” to “CP_SCS7” to the action using the event/action function, the file can automatically be saved on the floppy disk or SCSI device. In this case, all files are copied (except for report data).

Display During Copying

The following status is displayed in sub-display 2 (the lowest display field).

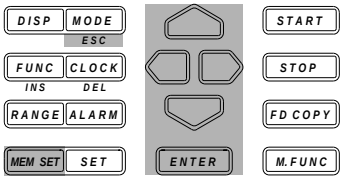
B : File copying in process

Note

- While copying is in process, set-up data cannot be saved or read.
- Do not leave a floppy disk in the disk drive for a long period. Dust may get into the floppy disk drive and cause it to fail.
- When copying a file, do not set any item relating to floppy disks, MO, ZIP or PD such as the viewing of directories. The file may not be copied correctly.

7.2 Copying after Conversion of the Data to ASCII Data

Relevant Keys



Operating Procedure

- Press the MEM SET key to enter the MEM SET menu.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)
MEMORY=

CONVERT ENTER → **(Lower menu)**

(A CODE NUMBER=)[*1]**(ENTER)**

CONV FILE=AAA ENTER
AAA BBB CCC DDD

CONV CH=001 -A05
>Select Channel No.

CONV CH=001- A05 ENTER
>Select Channel No.

CONV DAT= 1 - 200
>Start limit (1~200000)

CONV DAT= 1 - 200 ENTER
>End limit (1~200000)

CONVERT DRIVE=FLOPPY[*2] ENTER
FLOPPY SCSI0 SCSI1 SCSI2 SCSI3
SCSI4 SCSI5 SCSI6 SCSI7

Copying... *

*****CONV COPY OK*****(End of setting) ESC

*1 Displayed when copy lock is set at the SET UP menu.
*2 Displayed when the SCSI option (/C5) is installed.

Explanation

Measured/computed data or periodic file in the internal RAM disk is converted to ASCII data, then copied to a floppy disk, MO, ZIP or PD. Report files cannot be converted to ASCII data and copied. The identifier is .CSV.

Conversion channel (CONV CH)

Used to select a channel whose data is to be converted to ASCII data. Measurement channels and computation channels are arranged in the order of 001, 002, ... 560, A01, A02, ... A60. For instance, if "559-A02" is specified, data for channels 559, 560, A01 and A02 will be converted.

Conversion data (CONV DATA)

Used to specify the conversion range for the channels specified by CONV CH. Enter the conversion start data No. and end data No.

Copy Destination (CONV DRIVE)

Displayed when the SCSI option (/C5) is installed. Select the copy destination from the built-in floppy disk of the DC100, external MO, ZIP or PD. For MO, ZIP and PD, select using the SCSI ID.

Data capacity

When measured/computed data is converted to ASCII data, 12 bytes will be used for each data set. Thus, the data capacity can be calculated as follows.
Data capacity = 178 + 20 x number of conversion channels - 2 + (24 + 12 x number of conversion channels -1) x number of data sets to be converted
Copying is not possible if the destination's disk capacity is insufficient.

Data format

ASCII converted data is saved in the following format.

```
"Sample by Stand-alone"
"Trigger Time","96-02-14 15:05:07"  <-- Trigger date/time
"Sample Rate(Sec)", 2               <-- Writing interval
"Start Data No.", 1                 <-- ASCII conversion data No.
"Data Length", 20                   <-- Data length (number of data sets)
"Ch.Name","TURBINE1","TURBINE2","TURBINE5","TURBINE7","TURBINE0"  <-- Channel No. or tag
"Unit","mV      ","Kg/mm   "," C        "," C      "," C      "  <-- Unit
"YY-MM-DD HH:MM:SS.S"   <-- Data that was trigged
"96-02-14 15:05:07.0","     12.520","     315.00","       23.2","       -5.0"," 16.3"
"96-02-14 15:05:09.0","     12.322","     315.05","       23.2","       -4.9"," 15.9"
"96-02-14T15:05:11.0","     13.724","     315.20","       23.3","       -4.8"," 15.9"
"96-02-14 15:05:13.0","     13.220","     315.12","       23.3","       -4.9"," 15.8"
"96-02-14 15:05:15.0","     13.925","     315.60","       23.3","       -4.9"," 15.8"
"96-02-14 15:05:17.0","     13.227","     315.55","       23.3","       -4.9"," 16.0"
"96-02-14 15:05:19.0","     13.928","     315.04","       23.3","       -5.0"," 16.1"
"96-02-14 15:05:21.0","     12.620","     315.29","       23.3","       -5.1"," 16.1"
"96-02-14 15:05:23.0","     12.643","     315.01","       23.2","       -5.1"," 16.2"
"96-02-14 15:05:25.0","     13.426","     315.05","       23.2","       -5.1"," 16.3"
"96-02-14 15:05:27.0","     12.227","     315.42","       23.2","       -5.2"," 15.9"
```

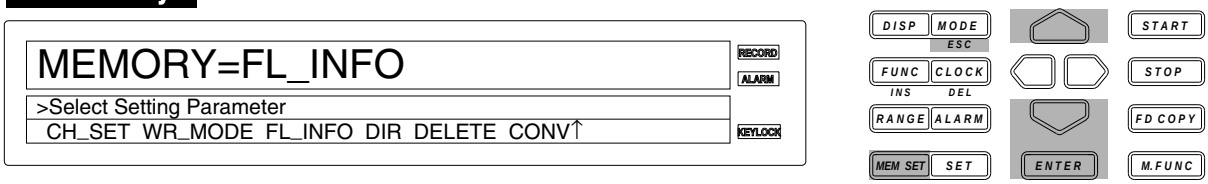
Saving date/time — Data

Note

- The following special ASCII codes will be converted as follows.
  - ° → Space (20H)
  - Ω → Space (20H)
  - μ → u (75H)
  - ε → e (65H)
  - ℧ → Space (20H)
- During copying, saving/reading set-up data cannot be made.
- The communication function remains disabled during copying.
- If you save data using a trigger, a T precedes the time attached to the data saved at the time of triggering.

7.3 Displaying File Information

Relevant Keys



Operating Procedure

- Press the MEM SET key to enter the MEM SET menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

MEMORY= ▭

△/▽

FL INFO — ENTER → **(Lower menu)**

INFO TYPE=DAT *1 — ENTER
DAT DAS RBI

↓

INFO FILE=AAA — ENTER
AAA BBB CCC DDD

↓

>MODEL=EXPANDABLE — ENTER
>97/07/07 00:00:00 LENGTH=200000
>SAMPLE= 10(Sec) TRIG DATA No.= 1

↓

>CHANNEL=001-60 — ENTER
>ON■ 001■■■■■■■■■■ □□□□□□□□□□ □□□□□□□□□□
>ON■ 031■■■■■■■■■■ □□□□□□□□□□ □□□□□□□□□□

*****FL_INFO END***** (End of setting) — ESC → (back to MEMORY=)

*1 Displayed when the report option (/M3) is installed.

Explanation

The measured/computed data file, report file or periodic file information saved in the built-in RAM disk is displayed.

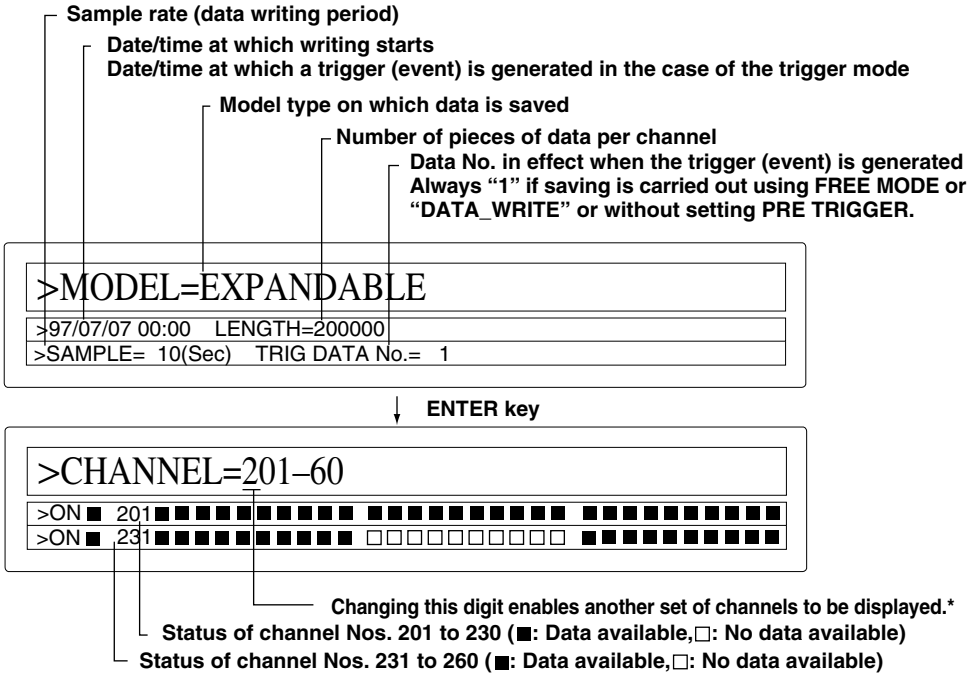
File Type

DAT: Measured/Computed data file
DAS: Periodic file
RBI: Report file

Displaying the contents of the file

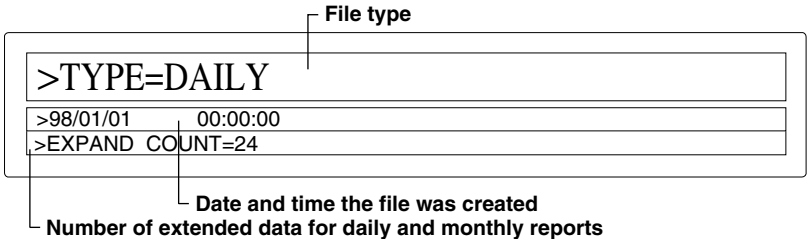
The following information is displayed.

- Measured/computed data file and periodic file



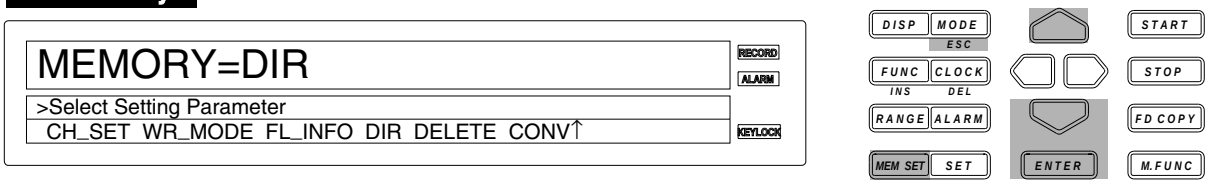
* If there is no computation option in the stand-alone model, additional channels cannot be displayed.

- Report file



7.4 Displaying Directory

Relevant Keys



Operating Procedure

- Press the MEM SET key to enter the MEM SET menu.
- Select/set ▒▒ using the ⏠⏡ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

MEMORY= ☐

⏠/⏡

DIR

(Lower menu)

ENTER → **MEMORY= 20000BYTE** *ENTER*

>FILE001.DAT 97/06/01 06:30

>FILE002.DAT 97/06/02 10:00

↓

*****DIR END***** (End of setting) *ESC*

Explanation

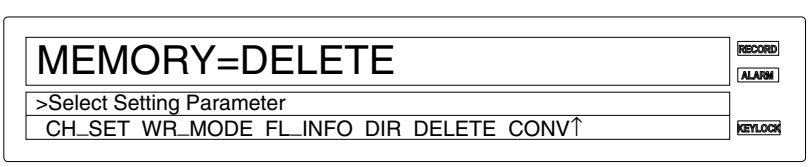
The directory and the free space available on the built-in RAM disk are displayed.

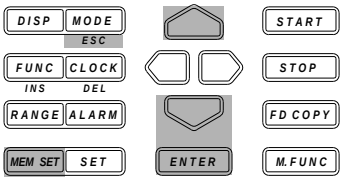
Directory

- File names and file creation dates are displayed.
- File names are displayed by switching using the ⏠ or ⏡ key.

7.5 Deleting Data File

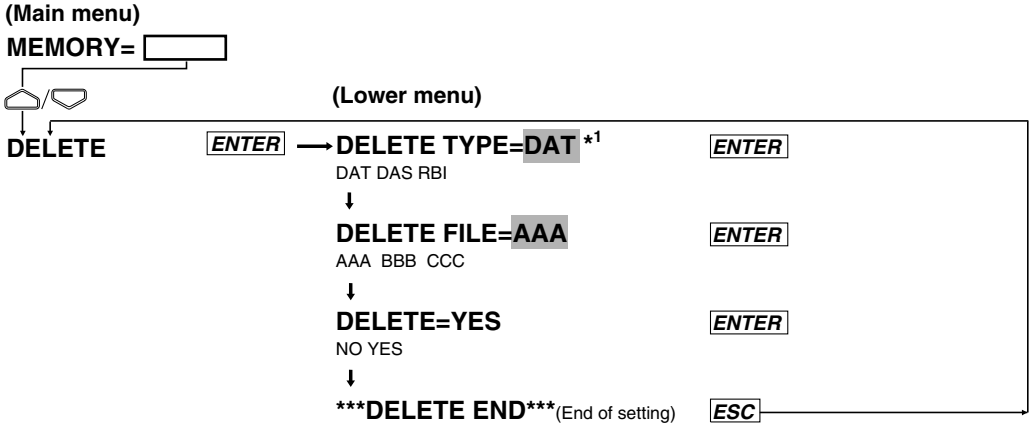
Relevant Keys





Operating Procedure

- Press the MEM SET key to enter the MEM SET menu.
- Select/set using the ⏶⏷ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.



*1 Displayed when the report option (/M3) is installed.

Explanation

Files saved in the built-in RAM disk are deleted.

File Type

DAT: Measured/Computed data file
DAS: Periodic file
RBI: Report file

Acknowledging File Deletion

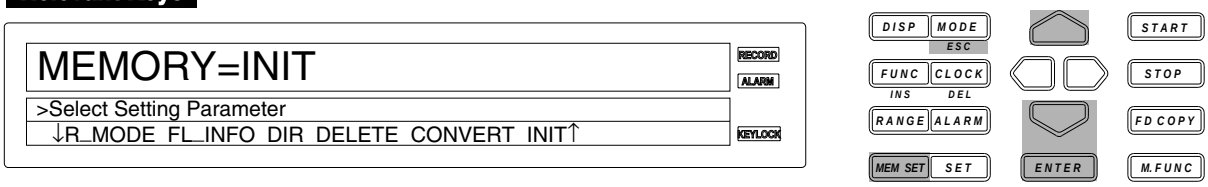
YES: The file is deleted.
NO: The file is not deleted.

Note

The communication function is suspended during deletion.

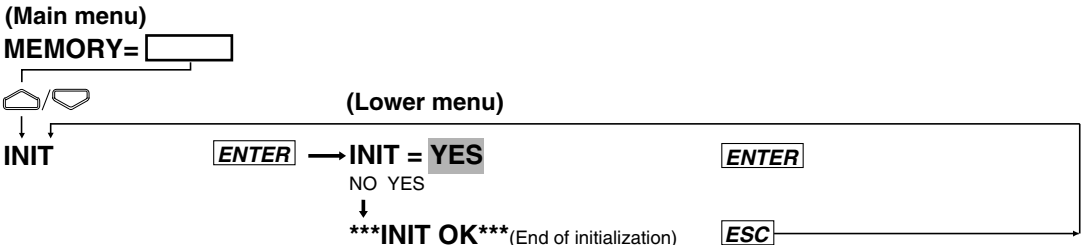
7.6 Initializing RAM Disk

Relevant Keys



Operating Procedure

- Press the MEM SET key to enter the MEM SET menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.



Explanation

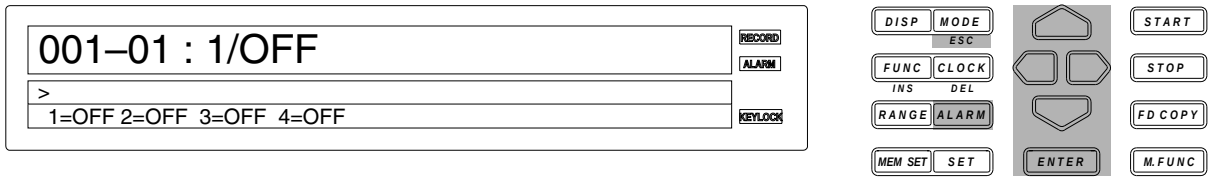
The internal RAM disk is initialized. All the data in the RAM disk will be deleted. Thus, copy necessary data to a floppy disk, MO, ZIP or PD before carrying out initialization.

Note

The communication function is suspended during initialization.

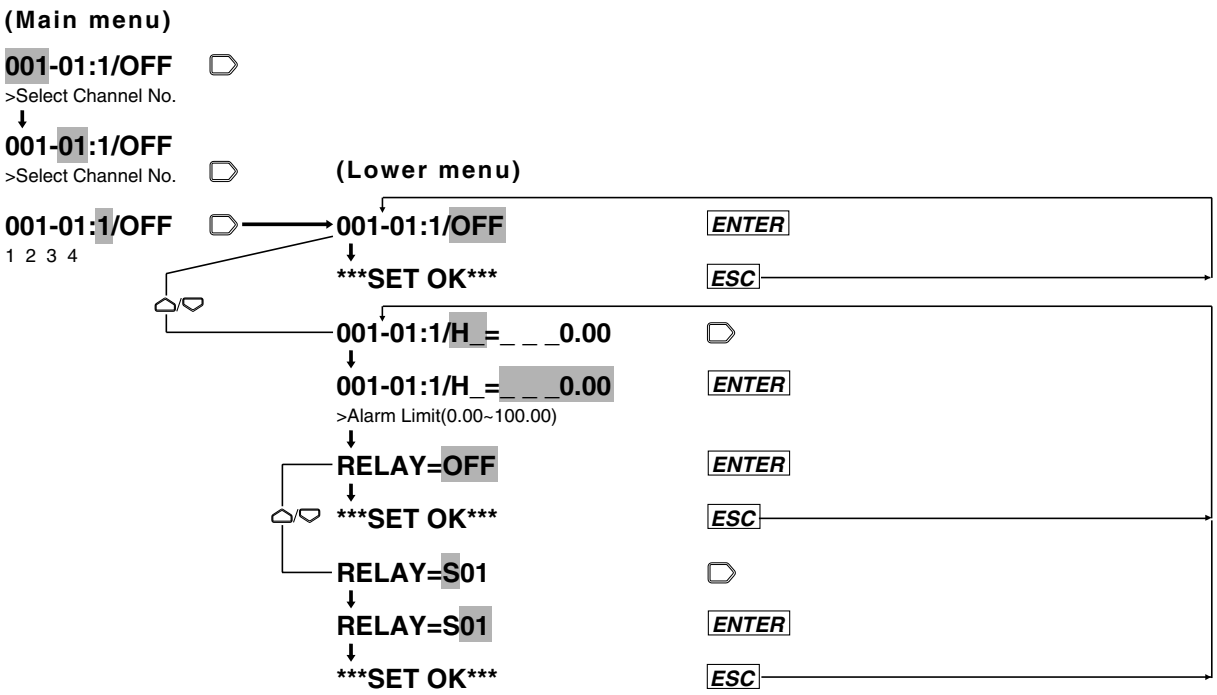
8.1 Setting Alarms and Relays (including internal switches)

Relevant Keys



Operating Procedure

- Press the [ALARM] key to enter the ALARM menu.
- Select / set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings / selections will not be kept.
- New settings/selections will be kept when you rach the final display of that setting.



Explanation

Selecting channel Nos.

Channels Nos. A01 to A60 are available for computation channels (optional).

Selecting the alarm item number

Set the alarm item number for each channel as follows:

- Select any number from among 1, 2, 3, and 4.
- Alarm numbers 1 to 4 can be set for one channel.

Note

- If SKIP is selected for the input type or if the computation channels are OFF, alarms cannot be set.
- In the following cases, the alarm is set to OFF:
  - If the input type or measuring range in the related channel is changed,
  - If computation channels are turned ON/OFF or the computation equation is changed,
  - If the span for the linear scaling, or linear scaling values is changed,
  - If the reference channel for differential computation between channels is changed, or
  - If the wiring method of power monitoring channels or the input range is changed.
- Setting the alarm or relay (including internal switches) gives more functions to this instrument. For details, see Section 9.1, “Setting Event and Action Functions” on page 9-1.

Selecting the type of alarm

Select an alarm type for each alarm number from among the following:

- OFF (default set): No alarm is set.
- H: Upper-limit alarm. An alarm occurs when the measured value exceeds the upper-limit alarm setpoint.
- L: Lower-limit alarm. An alarm occurs when the measured value exceeds the lower-limit alarm setpoint.
- RH: Rate-of-change upper-limit alarm. An alarm occurs when the measured value changes in the increasing direction within a certain time (rate-of-change alarm interval) and exceeds the upper-limit alarm setpoint.
- RL: Rate-of-change lower-limit alarm. An alarm occurs when the measured value changes in the decreasing direction within a certain time (rate-of-change alarm interval) and exceeds the lower-limit alarm setpoint.
- dH: An alarm occurs when the difference between two channels exceeds the upper-limit alarm setpoint. This only applies to a channel for which interchannel differential computation is selected, and can be set as a type of alarm.
- dL: An alarm occurs when the difference between two channels exceeds the lower-limit alarm setpoint. This only applies to a channel for which interchannel differential computation is selected, and can be set as a type of alarm.

- For details on the rate-of-change alarm interval setting or other basic alarm settings, see Section 10.3, “Select Alarm Interval/Hystresis/Hold/A/D Converter integration Timer/Filter” on page 10-4.
- For details on interchannel differential computation, see Section 5.1, “Setting the Type of Input and Span” on page 5-3.
- Only H (upper-limit alarm) and L (lower-limit alarm) are available for computation channels.

Setting alarm values

Set one alarm value for each alarm number within the following range, depending on the type of input. The default value is 0 (zero).

- H and L
  - VOLT, TC, RTD, DI, and DELTA: Within the measuring range in the related channel. DI can be set to either 0 or 1.
  - SCALE: Within a linear scaling value.
  - Computation channel: Within the range specified by the computation function.
- RH and RL
  - VOLT, TC, RTD, DI, and DELTA: Within 1 to [maximum measuring range minus minimum measuring range] in the related channel. For example, set 30000 (without using a decimal point) if the maximum value exceeds 30000. DI can be set to only 1.
  - SCALE: Set 1 to 30000 without using a decimal point.
- dH and dL
  - When the reference channel uses VOLT: Within the measuring range.
  - When the reference channel uses other than VOLT: [maximum measuring range minus minimum measuring range] to - [maximum measuring range minus minimum measuring range]
- For the type of input, see Section 5.1, “Setting the Type of Input and Span” on page 5-3.

Note

When setting alarm values in continuous channels, use the decimal point as follows:

The decimal point of an alarm value when the continuous channels have different measuring ranges should be in the position determined by the individual measuring range. If the decimal point is outside the measuring range, an error occurs. For example, if channels with measuring ranges 20 mV and 2 V, and a type T thermocouple channel, are all set to an alarm value of 10000, then the alarm values in the respective channels are as follows:

10.000 mV in the 20 mV measuring range channel
1.0000 V in 2 V measuring range channel
1000.0°C in the type T thermocouple channel

A type T thermocouple has a measuring range from -200.0 to 400.0°C, so an error results. For details on the decimal point positions in individual measuring ranges, see Chapter 14, “Specifications.”

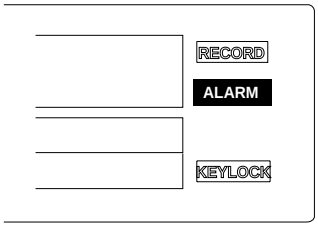
Setting Relays (Internal Switches)

Set which alarm output relay or internal switch should be triggered when an alarm occurs:

- Select the desired alarm output relay or internal switch from among the following. The default setting is OFF.
  - OFF: Alarm output relays and internal switches remain OFF.
  - S01 to S60: 60 internal switches are provided.
  - UMN
    U: Unit number for an alarm module or a DI/DO module. M: Slot number for an alarm module or a DI/DO module. N: Number 0 to 9. For details, see page 3-8.
- Multiple alarm setpoints can be set for one alarm output relay or internal switch.
- The operation mode in the alarm output relay or internal switch can be set when an alarm occurs. For details, see Section 10.4, “Setting Operation Mode of Relay/Internal Switch” on page 10-5.
- When the alarm module or DI/DO module is not recognized as system module, the relay is set to OFF. For the system recognition, see page 3-31.

8.2 Acknowledging Alarm Display

Display



Explanation

Alarm display

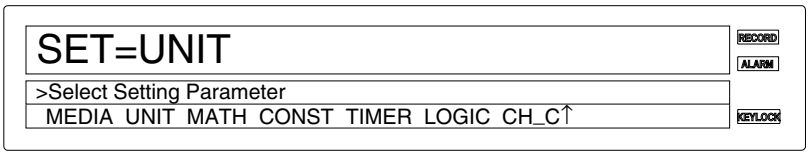
- When an alarm status is detected and an alarm is issued, the [ALARM] lights.
- To display the alarm status for each channel, see Section 4.4, “Using the ALARM SEARCH Display” on page 4-7 or Section 4.8, “Using the ALARM STATUS Display” on page 4-12.
- To display the alarm output relay or internal switch status, see Section 4.9, “Using the RELAY STATUS Display” on page 4-13.
- If an alarm occurs while the alarm display hold (ALARM HOLD) is ON (because the alarm has already been triggered), the [ALARM] and alarm status displays flash. Even after the alarm status is released, the displays still flash.
- When the alarm status hold function is ON, use the alarm acknowledge function to determine the current status of the alarm. To do this, display the FUNC menu, select ALARM-ACK, then press the [ENTER] key to use the alarm acknowledge function. For details, see Section 2.4, “Alarm Function” on page 2-8.

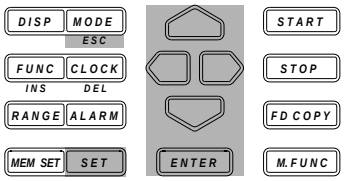
Alarm reset

This function is selected from the FUNC menu when the relay hold function (see page 10-7) is activated. To use the alarm reset function, select [ALARM RST], then press the ENTER key to use the alarm reset function. For details on the alarm reset, see Section 2.4, “Alarm Function” on page 2-8.

8.3 Setting the Engineering Unit

Relevant Keys





Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set [ ] using the ⌓ ⌔ keys.
- To escape from a lower menu, press the "MODE (ESC)" key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET= [ ]

(Lower menu)

UNIT — *ENTER* → **001-01:UNIT=**_ _ _ _ _ _ ⌦

>Select Channel No.

↓

001-01:UNIT=_ _ _ _ _ _ ⌦

>Select Channel No.

↓

001-01:UNIT=Ω_ _ _ _ _ *ENTER*

>↓%&()+-*/.:°με 0123- - -89 ABC- - -KL↑

↓

*****SET OK*****(End of setting) *ESC* → (back to UNIT)

Explanation

Engineering Unit (UNIT)

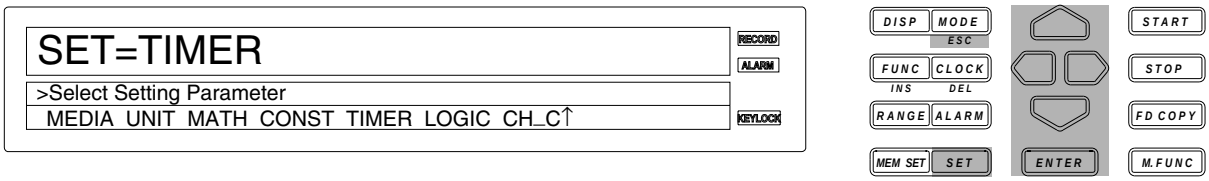
An engineering unit of up to six characters can be assigned to each channel. The default setting is all spaces.

The characters/numbers can be selected by cursor from the displayed row on sub-display 1. An engineering unit can only be assigned to channels to which linear scaling is applied. For details concerning entering characters/numbers, refer to page 8-8.

If the instrument is equipped with the optional computation function, make sure that channel Nos. are set between A01 and A60 (for the expandable model) or A01 and A30 (for the stand-alone model) when specifying the measurement units for computation channels.

8.4 Setting the Timer

Relevant Keys



Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set using the ⌓ ⌔ keys.
- To escape from a lower menu, press the "MODE (ESC)" key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET=

(Lower menu)

TIMER — *ENTER* → **TIMER No.=1** *ENTER*

1 2 3 4 5 6

↓

1:TIMER MODE=RELATIVE *ENTER*

↓

1:TIME=00 01: 00 *ENTER*

>Set Day & Time DD HH:MM:00

↓

⌓/⌔

*****SET OK*****(End of setting) *ESC*

1:TIMER MODE=ABSOLUTE *ENTER*

↓

1:TIME=1h *ENTER*

1min 2min 3min 4min 5min 6min 10min
12min 15min 20min 30min 1h 2h 3h 4h 6h
8h 12h 24h

↓

1:REF TIME=00:00 *ENTER*

↓

*****SET OK*****(End of setting) *ESC*

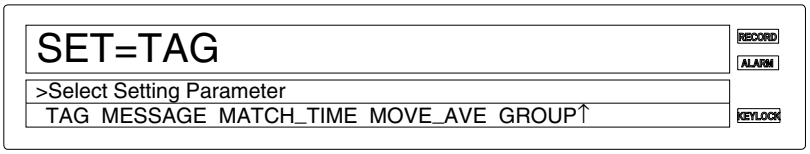
Explanation

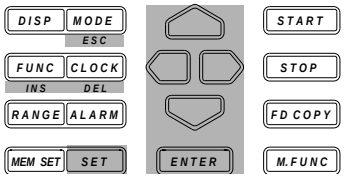
Setting the Timer (TIMER)

- TIMER No.
  You can set up to six timers.
- TIME MODE
  The following two modes can be selected. The default is RELATIVE.
  - RELATIVE; the number of days/hours/minutes can be set to any value between 00 days 00 hours 01 minute to 31 days 23 hours and 59 minutes, in one-minute steps. The default setting is 00 days, 01 hours and 00 minutes.
  - ABSOLUTE; the time interval can be selected from the following settings. The default setting is 1h.
    1min, 2min, 3min, 4min, 5min, 6min, 10min, 12min, 15min, 20min, 30min, 1h, 2h, 3h, 4h, 6h, 8h, 12h, and 24h.
    The reference time is set by the hour and minutes. The default value is 00 hrs, 00 min.
- The timer setting is used with the event/action function (refer to page 9-1).

8.5 Setting Tag and Message

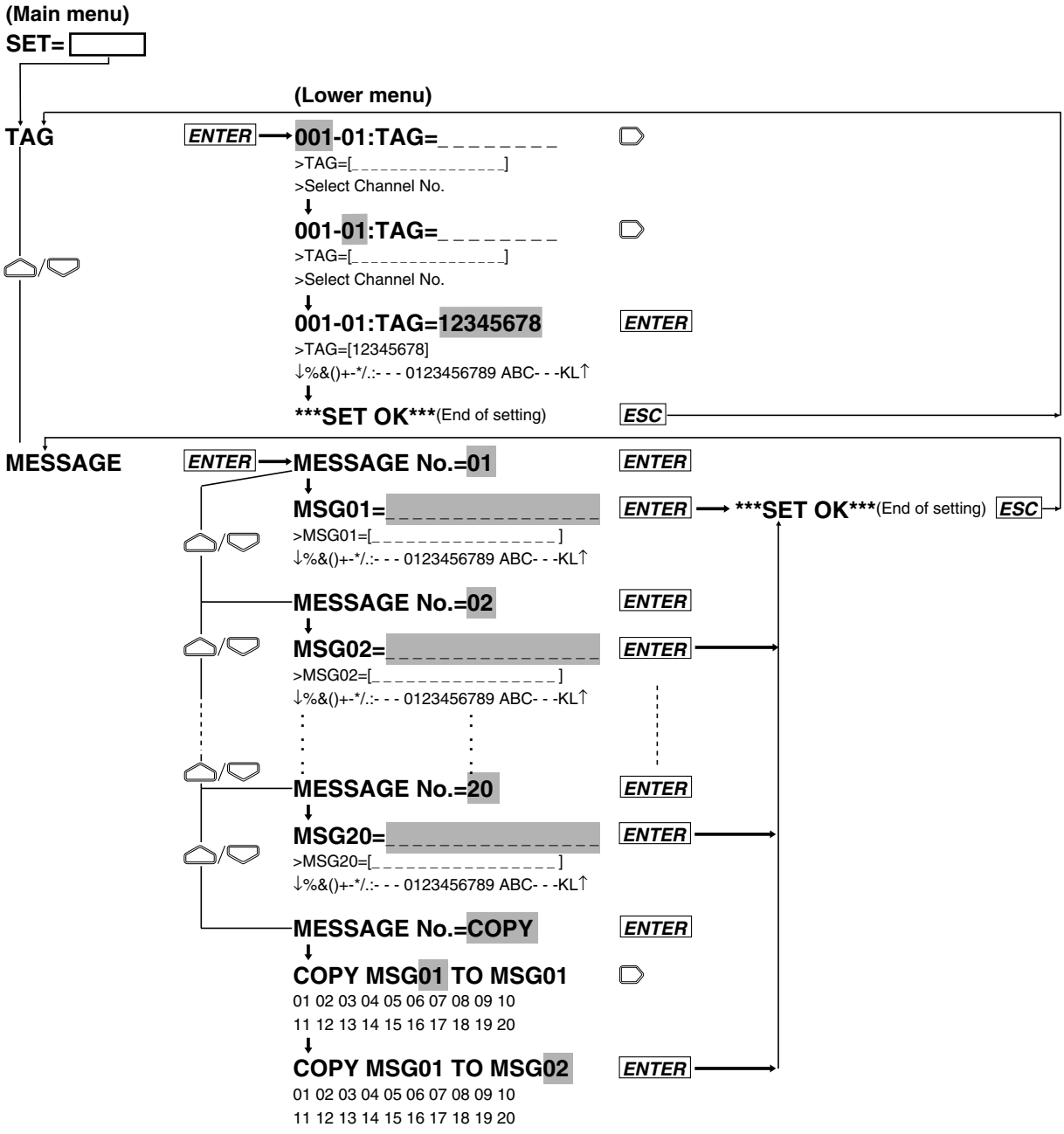
Relevant Keys





Operating Procedure

- Press the SET key for three seconds to enter the SET3 menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the "MODE (ESC)" key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.



Explanation

Tag Setting

A tag of up to 8 characters can be assigned to each channel. If the instrument is equipped with the optional computation function, this setting can also be made for computation channels A01 to A60 for the expandable model or A01 to A30 for the stand-alone model. The characters/numbers for the tag can be selected by cursor from the displayed row on sub-display 1. For details on the number of characters which will be displayed, refer to 4.1 on page 4-2. To select whether the tag or channel number are displayed, refer to 10.2 on page 10-2. The default settings are all spaces.

Entering a Message

MESSAGE No. (selection of the message No.)

Up to 20 messages can be entered.

MSG01 to 20 (entering the message)

The message contents can be entered here using up to 16 characters. Characters and numerals can be selected from the menu. The default setting is all spaces.

COPY (copying messages)

The contents of an entered message (message No. at the left side of the setting) can be copied to another message number (at the right side of the setting). You cannot copy to the same message number.

Displaying a message

A message can be displayed on the main display using the event/action function.

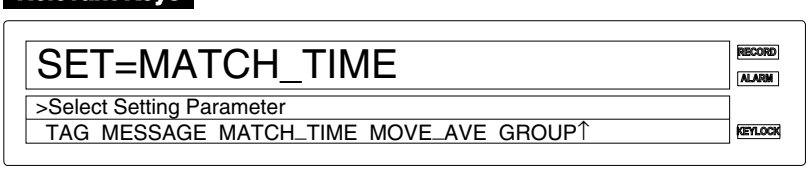
Inserting/Deleting a Character or Numeral

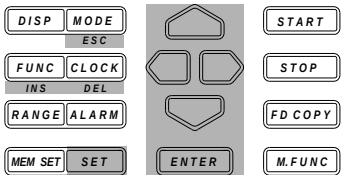
Press the CLOCK(DEL) key to delete a set character or numeral. The digit at the location of the cursor will be deleted.

Press the FUNC(INS) key to insert a character or numeral. The digit at the location of the cursor will become a space, while all the characters/numerals at the right side of the cursor will move one digit to the right.

8.6 Setting the Match Time and Moving Average

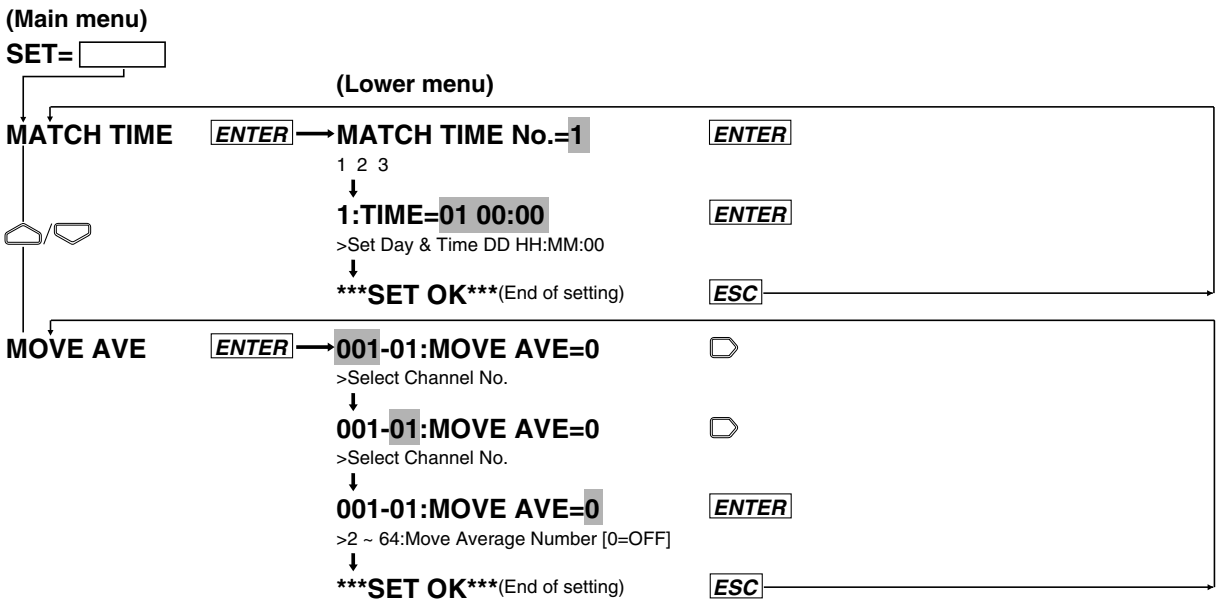
Relevant Keys





Operating Procedure

- Press the SET key for three seconds to enter the SET3 menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the "MODE (ESC)" key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.



Explanation

Setting the Match Time (MATCH TIME)

MATCH TIME No. (selection of the match time number)

Three kinds of match times can be set.

TIME

Any time between 00 days, 00 hrs., 00 min. and 31 days, 23 hrs, 59 min. can be set in 1-minute units. The default setting is 01 days 00 hrs 00 min.

If 00 is set to day (DD), HH:MM every day shows the set time. If day (DD) is set to a value other than 00, HH:MM of DD day every month shows the set time. DD, HH, and MM give the set numeric values respectively.

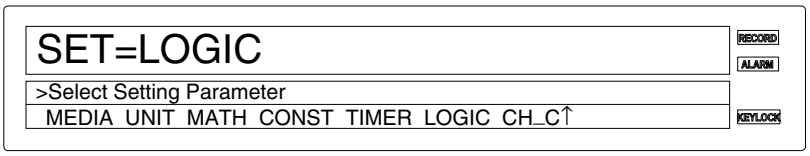
The match time setting is used with the event/action function. Refer to 9.1 on page 9-1 for details.

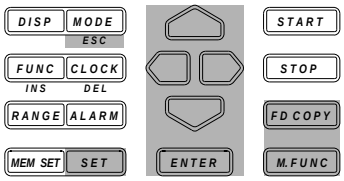
Moving Average (MOVE AVE)

This setting can be set for each channel individually. The number of samples used for the moving average can be set from 2 to 64. The default value is 0, which means that no moving average is carried out. The result of the moving average is being displayed.

9.1 Setting Event/Action Functions

Relevant Keys

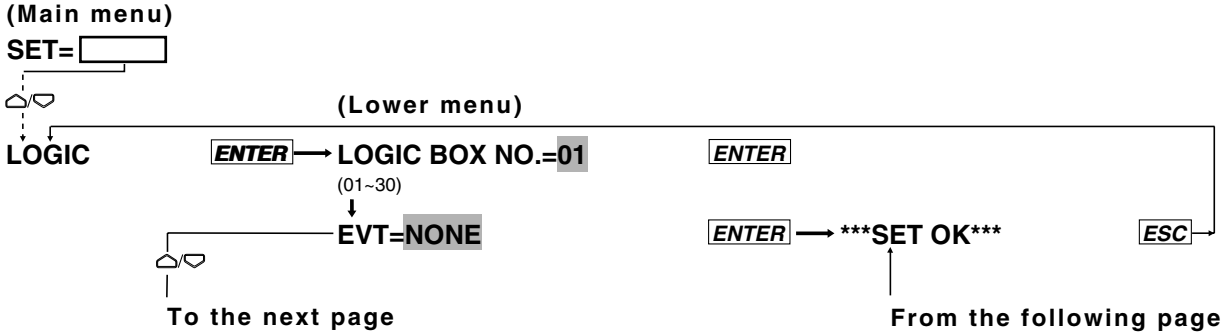




Operating Procedure

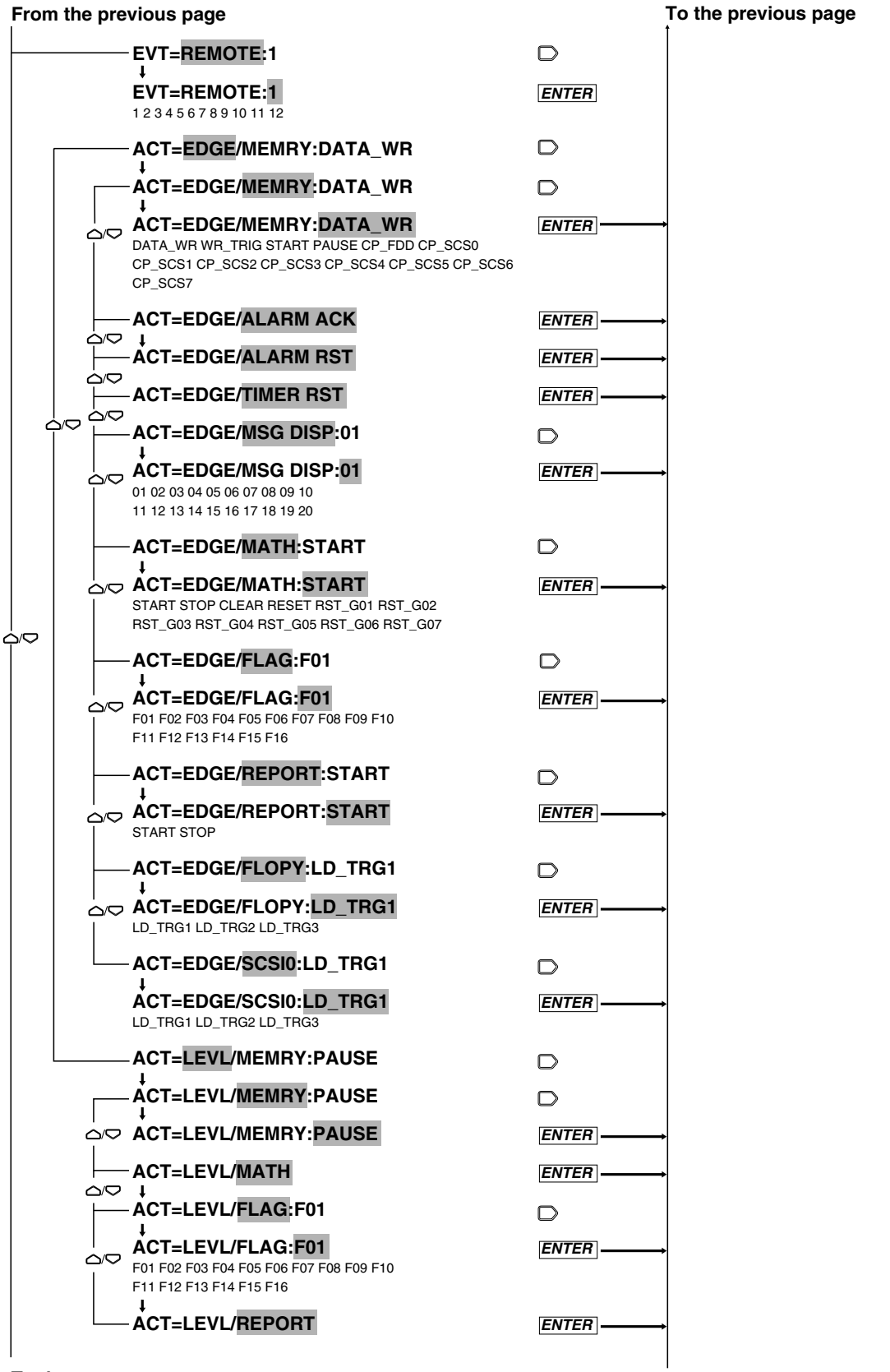
- Press the SET key to enter the SET menu.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

Selection of the logic box and event [NONE]



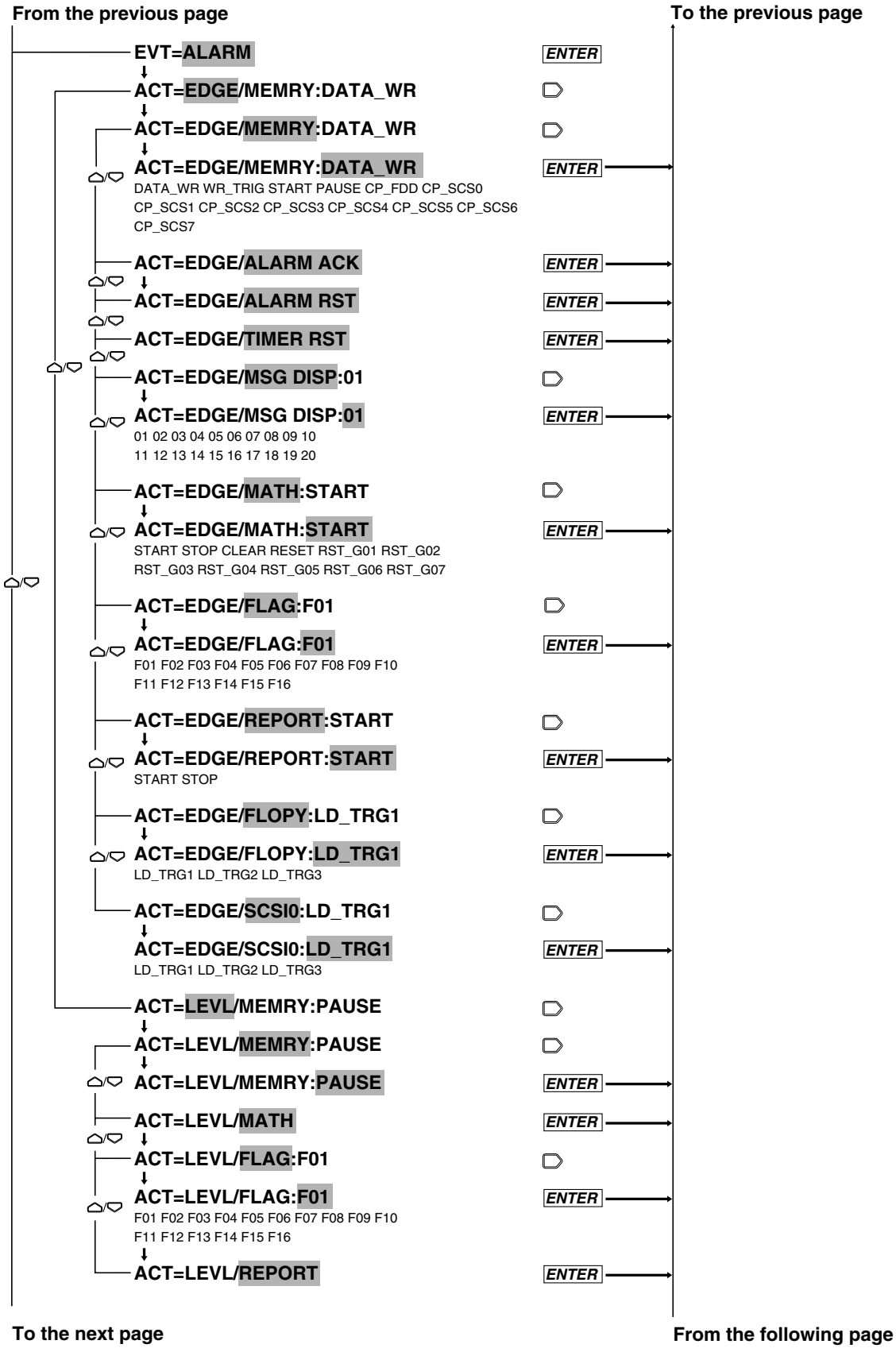
Selection of event [REMOTE]/actions

The [REMOTE] menu is displayed only on the models with DI/DO module.
The [MATH] menu is displayed only on models with the /M1 option or when the pulse module is installed.
The [REPORT] menu is displayed only on models with the /M3 option.
The [FLAG] menu is displayed only on models with the /M1 option.
The [SCSI0] to [SCSI7] menus are displayed only on models with the /C5 option.



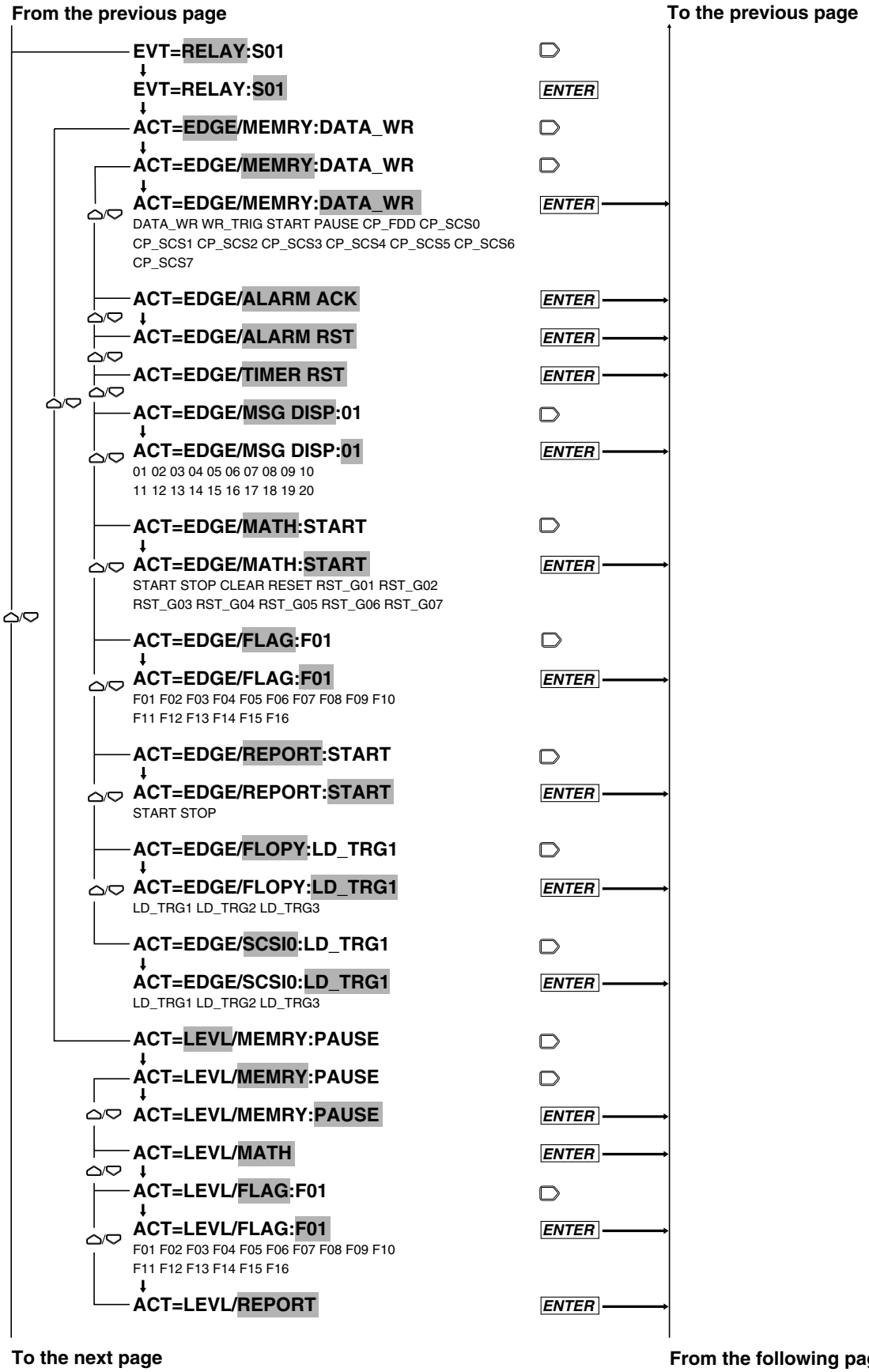
Selection of event [ALARM]/actions

The [MATH] menu is displayed only on models with the /M1 option or when the pulse module is installed. The [REPORT] menu is displayed only on models with the /M3 option. The [FLAG] menu is displayed only on models with the /M1 option.
The [SCSI0] to [SCSI7] menus are displayed only on models with the /C5 option.



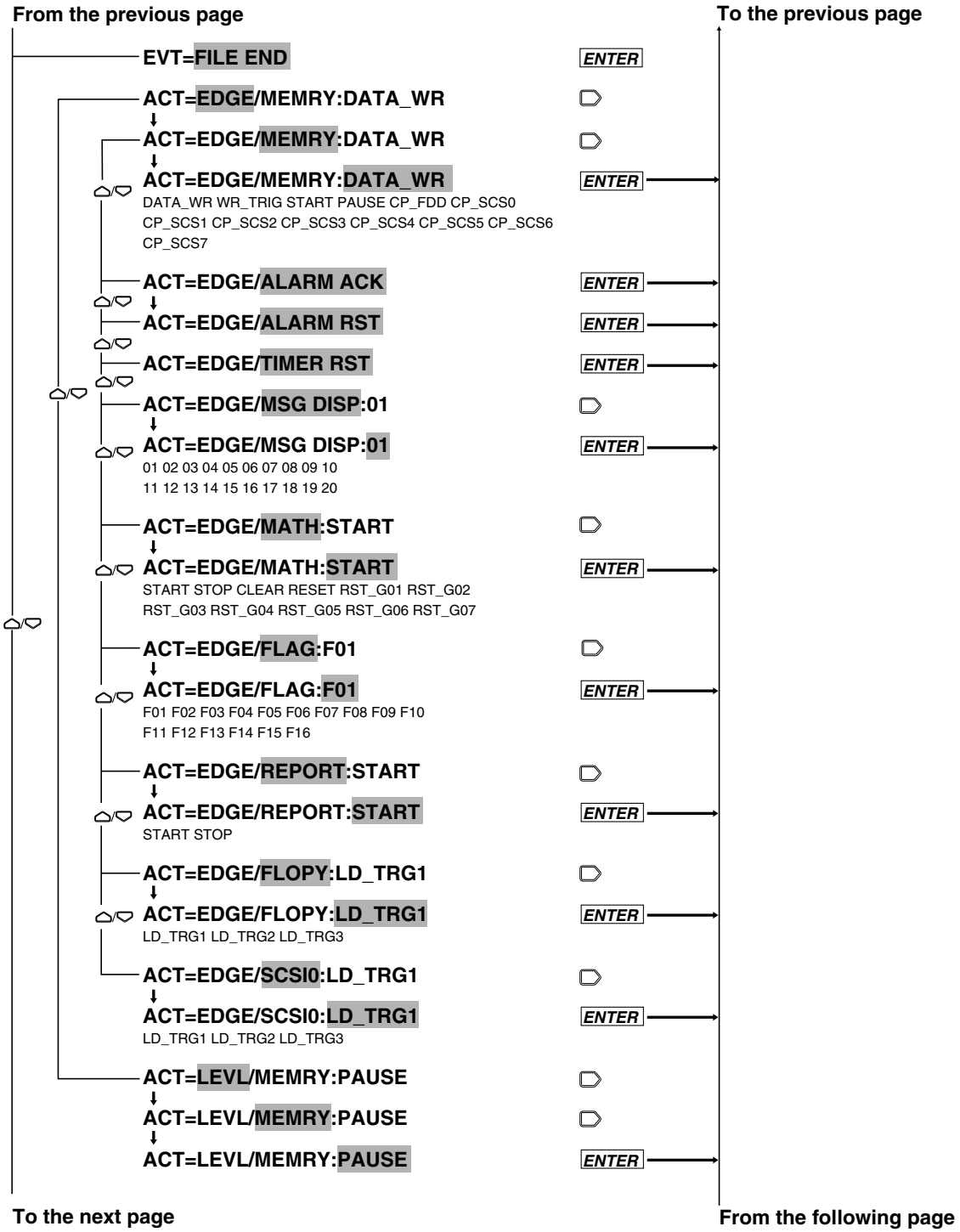
Selection of event [RELAY]/actions

The [MATH] menu is displayed only on models with the /M1 option or when the pulse module is installed. The [REPORT] menu is displayed only on models with the /M3 option. The [FLAG] menu is displayed only on models with the /M1 option.
The [SCSI0] to [SCSI7] menus are displayed only on models with the /C5 option.



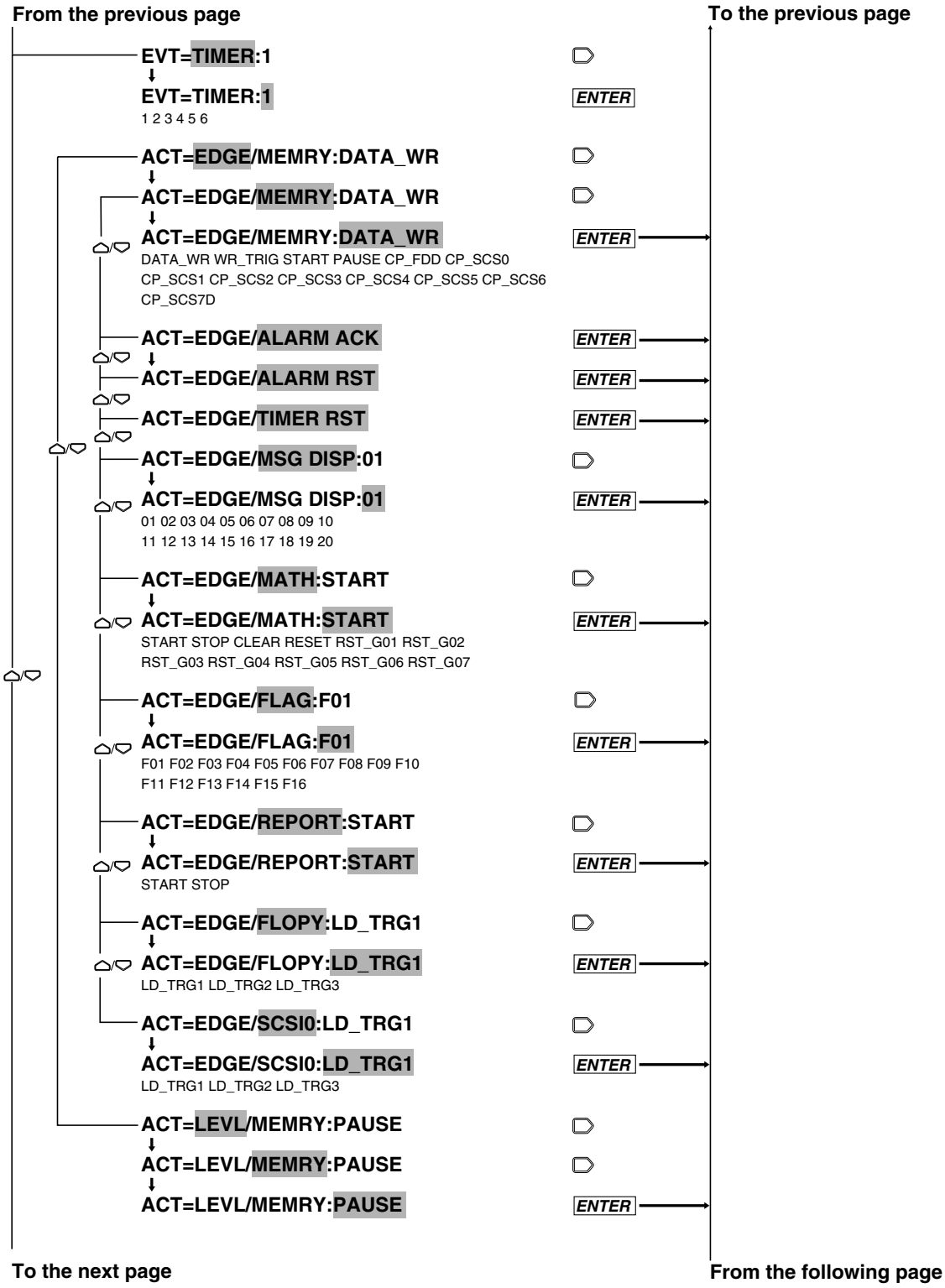
Selection of event [FILE END]/actions

The [MATH] menu is displayed only with models on the /M1 option or when the pulse module is installed. The [REPORT] menu is displayed only on models with the /M3 option. The [FLAG] menu is displayed only on models with the /M1 option.
The [SCSI0] to [SCSI7] menus are displayed only on models with the /C5 option.



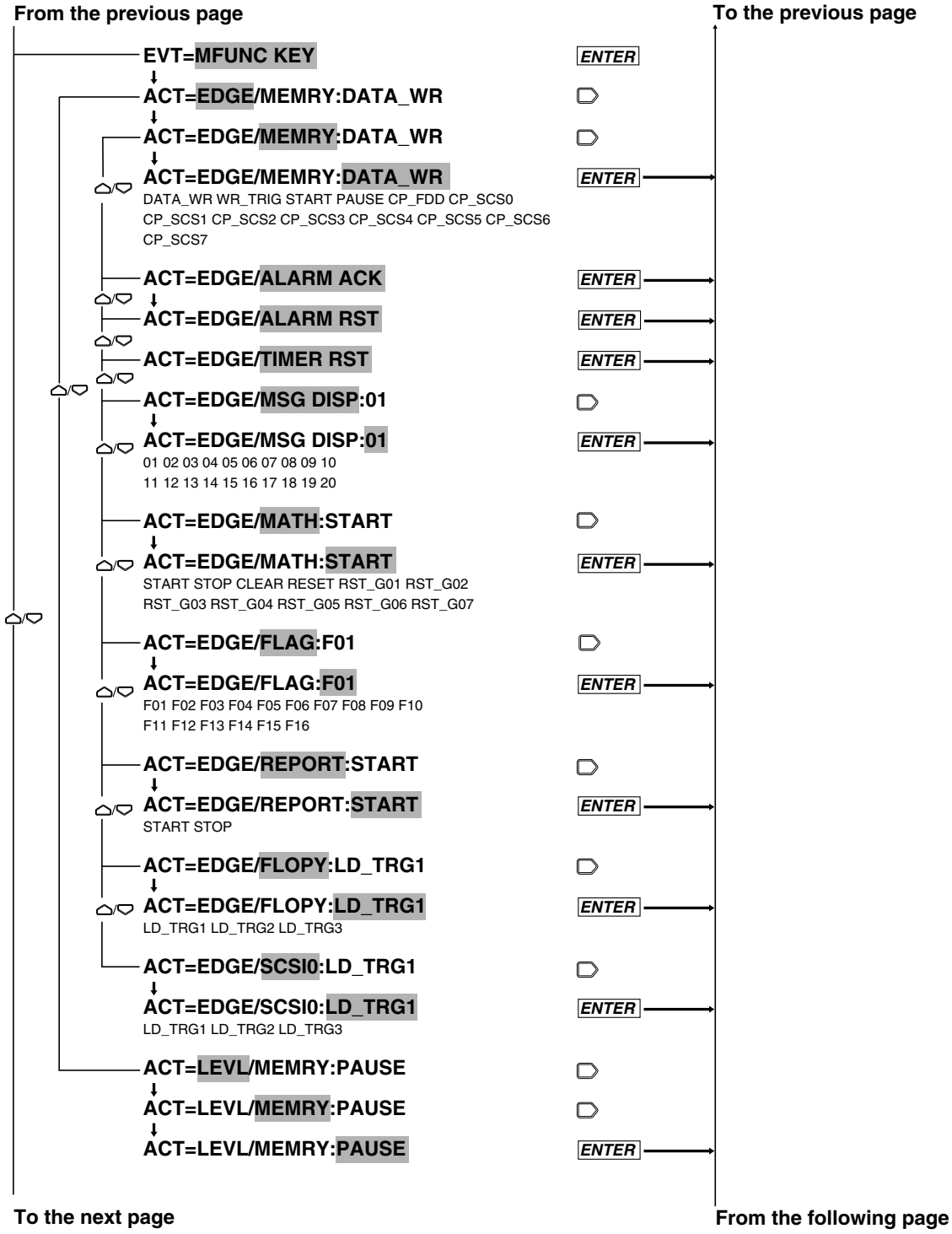
Selection of event [TIMER]/actions

The [MATH] menu is displayed only on models with the /M1 option or when the pulse module is installed. The [REPORT] menu is displayed only on models with /M3 option. The [FLAG] menu is displayed only on models with the /M1 option.
The [SCSI0] to [SCSI7] menus are displayed only on models with the /C5 option.



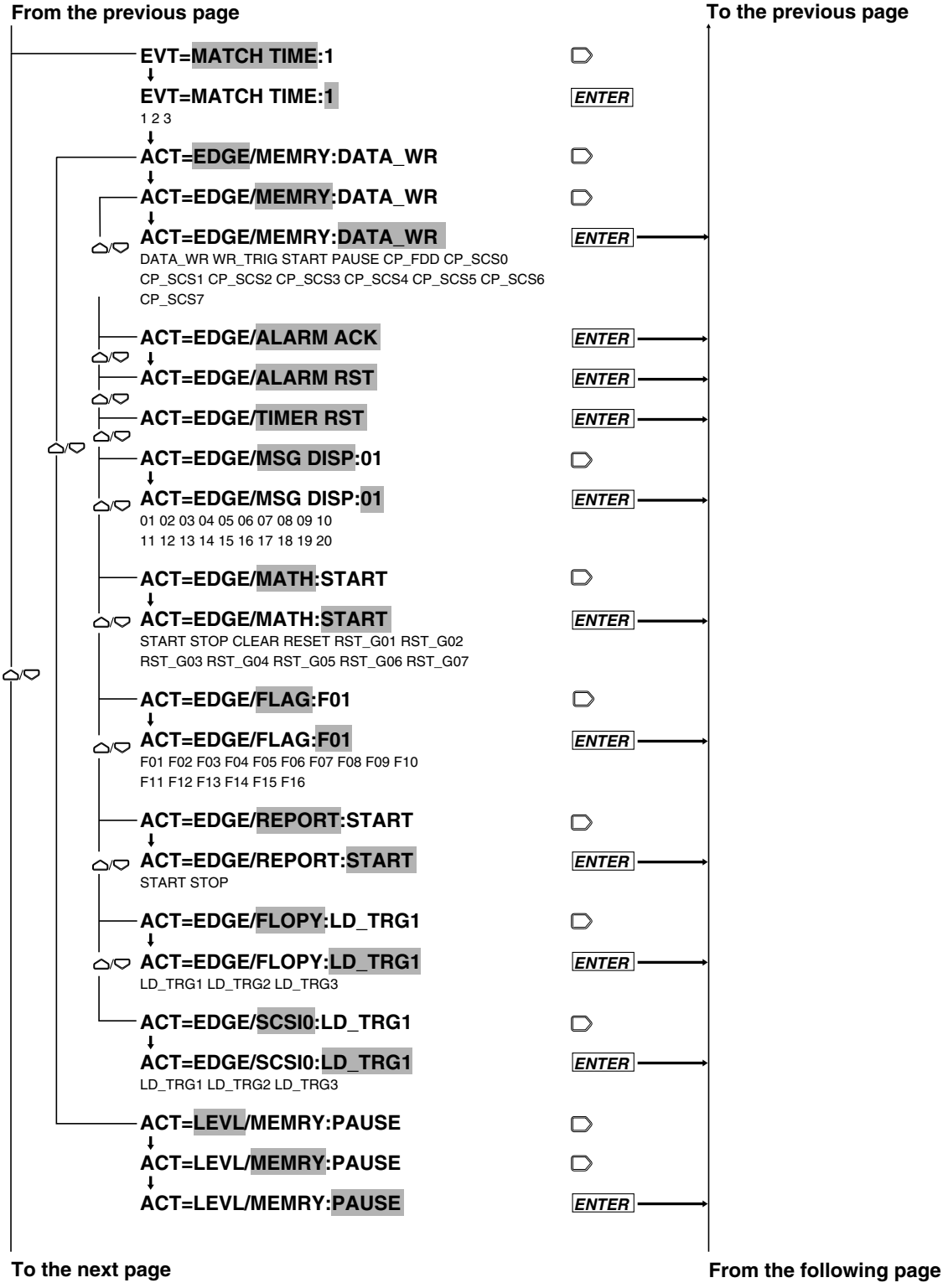
Selection of event [MFUNC KEY]/actions

The [MATH] menu is displayed only on models with the /M1 option or when the pulse module is installed. The [REPORT] menu is displayed only on models with /M3 option. The [FLAG] menu is displayed only on models with the /M1 option.
The [SCSI0] to [SCSI7] menus are displayed only on models with the /C5 option.



Selection of event [MATCH TIME]/actions

The [MATH] menu is displayed only on models with the /M1 option or when the pulse module is installed. The [REPORT] menu is displayed only on models with the /M3 option. The [FLAG] menu is displayed only on models with the /M1 option.
The [SCSI0] to [SCSI7] menus are displayed only on models with the /C5 option.



Explanation

When an event is detected, this menu allows you to set and execute a certain action.

Selection of logic (LOGIC) box number

- Select a box number from among 01 to 30 for storing a combination logic from events to actions.
- If you select the same number as the box number having an event and action already set, and set another event and action to that box number, the new setting will replace the old one.

Selection of events (EVT)

Select any event from among the following:

- NONE — releases the event/action setting.
- REMOTE
  - This menu is displayed only with the DI/DO modules that are recognized as system modules (see page 9-17).
  - When a remote control signal is applied, the action is executed.
  - There are 12 control signals available. Select any control signal from these numbers for event setting. Remote control signal terminal numbers are applicable for this selection. See page 3-18 for the remote control terminal numbers.
- ALARM
  If an alarm occurs, the action is executed. See Section 8.1, "Setting Alarms and Relays (including internal switches)," on page 8-1 for setting alarms.
- RELAY
  If the selected internal switch or relay is operating, the action is executed. When the alarm module or the DI/DO modules are not recognized as system modules (see page 9-17), the relay is set to OFF. See Section 8.1, "Setting Alarms and Relays (including internal switches)," on page 8-3 for setting internal switches and relays.
- FILE END
  When the end of file (the time when the writing operation is terminated and the file is closed) is detected, the action is executed.
- TIMER
  - If the selected timer's set time is up, the action is executed. Six timers are available. Select any from among these timers. See Section 8.4, "Setting the Timer," on page 8-6 for the timer setting provided earlier in this manual.
  - In combination with the level action, the action is repeated alternately between executing and stopping each time the timer's set time is up.
- MFUNC KEY
  - When the M.FUNC key on the operation panel is pressed, the action is executed.
  - In combination with the level action, the action is repeated alternately between executing and stopping each time the M.FUNC key is pressed.
- MATCH TIME
  - When the set time is reached, the action is executed.
  - There are three types of applicable MATCH TIMEs. Select any of them. For details, see Section 8.6, "Setting the Match Time and Moving Average" on page 8-9 provided earlier in this manual.
  - In combination with the level action, the corresponding action is repeated alternately between executing and stopping for each set time.

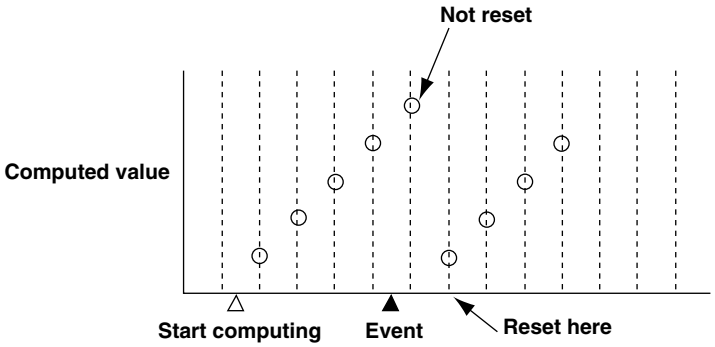
Selecting edge or level action

- Edge action (EDGE)
  This action is executed when an event is detected.
- Level action (LEVL)
  This action is executed when an event is detected. When an event is released, this action will be canceled.

Selection of actions

An action that can be selected varies depending on the events and edge or level action. See the individual procedures. The following describe all actions available.

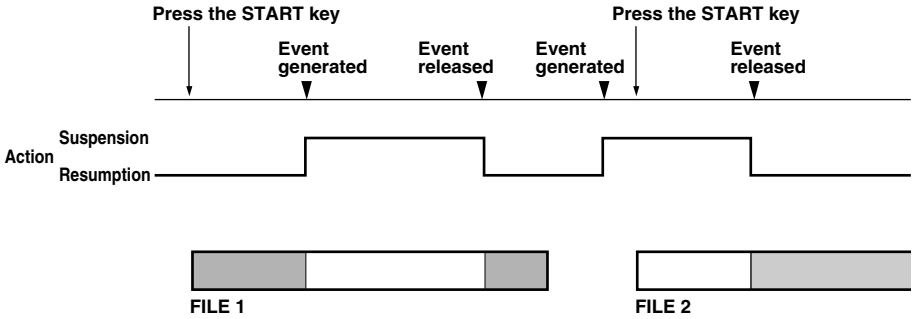
- ALARM ACK
  This allows alarm acknowledgment. For the applicable functions, see Section 2.4, "Alarm Function," on page 2-9.
- ALARM RST
  This resets alarms. When the "RELAY" is selected for an event, this function cannot be selected. For the applicable functions, see Section 2.4, "Alarm Function," on page 2-9.
- TIMER RST
  This resets timers. For the applicable functions, see Section 2.6, "Other Functions," on page 2-11.
- MSG DISP
  - Displays messages.
  - Select any message from the corresponding codes 01 to 20.
  - To cancel the message display, press any key.
- MATH (available if the instrument is equipped with the MATH function)
  - START: Starts computation.
  - STOP: Stops computation.
  - RESET: Resets computation channel data at the end of completion of the first computation in case an event take p lace.
  - CLEAR: Resets computation channel data immediately in case an event takes place.
  - RST_G01 to RESET_G07: Resets the computing channel data registered in the specified group number to 0. This is invalid for measuring channels. The timing for resetting the data is as follows.



  - If MATH is selected as a level action, computation will be carried out while an event is present. Computation will stop when the event is cleared.
  - START/STOP of an edge action and a level action cannot be set at the same time.
  - For a level action, only one setting can be made.
- MEMRY
  - DATA_WR: Writes the data for one scan (one data/channel) retained at the generation of an event. To execute this, it is necessary to set LOGIC to the writing period.
  - TRIG: Generates a trigger to start writing. To execute this, it is necessary to set TRIG to WRITE TRIG. For an example of setting, see Section 6.3, "Starting of Writing Using Event or Action Functions" (page 6-9).
  - START: Opens a file and starts the writing operation. It is the same function as the START key on the operation panel.
  - PAUSE: In the case of edge action, writing is suspended at the generation of an event. In the case of level action, by setting the alarm, remote, relay or internal switch to the event, writing is suspended at the detection of an event and resumes at the resetting of the event (see the following figure). Setting the timer, match time or manual function key to the event repeats suspension and resumption of data writing at the generation of each event.
  - CP_FDD: All files in the built-in RAM disk are copied on a floppy disk. Whether to cancel files after copying or not depends on the setting in the MEM SET of the SET UP menu. Copying after a conversion to ASCII format cannot be done.

- CP_SCS0 to CP_SCS7:
  All files in the built-in RAM disk are copied on a MO, ZIP or PD. Whether to cancel files after copying or not depends on the setting in the MEM SET of the SET UP menu. Copying after a conversion to ASCII format cannot be done.
  Displayed only on models with the C/5 option. SCS0 to SCS7 represent the SCSI ID numbers. Check the ID numbers of SCSI devices that are connected, because ID numbers are displayed even if there are no devices connected to them.
- An edge action and a level action cannot be set at the same time.
- For a level action, only one setting can be made.
- If writing suspension/resumption is set as a level action, the following operation is developed.

Example of PAUSE operation



: Sections in which data are written

: Sections in which data are not written, although they are measured.

Note

If File End appears, counter-actions such as MEMRY: DATA_WR are not executed.

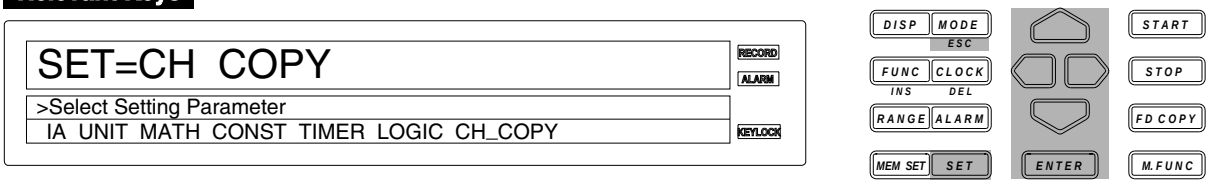
- FLOPY
  - LD_TRG1-3: Reads setup data from the floppy disk.
- SCSI0 to SCSI7 (only for /C5 optional model)
  - LD_TRG1 to 3: Read set-up data from the SCSI device (MO, ZIP or PD).
    SCSI0 to SCSI7 represent the SCSI ID numbers. Check the ID numbers of SCSI devices that are connected, because ID numbers are displayed even if there are no devices connected to them.
- FLAG (only for /M1 optional model)
  - F01 to 16: Set the flag number (F01 to F16) to 1. F01 to F16 are normally 0. Flags can be placed in computing equations to hold the computed result using a certain event as a trigger, or reset to 0.
- REPORT (available if the instrument is equiped with the /M3 option.)
  - START: Starts making up a report.
  - STOP: Stops making up a report.

Note

If, in the SETUP mode, the report function is set to OFF for all data items, you cannot select the action item REPORT.

9.2 Executing Inter-channel Copying

Relevant Keys



Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET=

(Lower menu)

CH COPY — *ENTER* → **COPY RANGE=ON** — *ENTER*

OFF ON

COPY ALARM=ON — *ENTER*

OFF ON

COPY OTHER=ON — *ENTER*

OFF ON

COPY 001ch TO 002-10ch

COPY 001ch TO 002-10ch

COPY 001ch TO 002-10ch — *ENTER*

SET OK**(End of setting) — *ESC*

Explanation

Selecting range copying (COPY RANGE)

- ON: Copies the type of input, measuring ranges, spans, linear scaling, engineering units, and tags set.
- OFF: The copying of ranges is disabled.

Selecting alarm copying (COPY ALARM)

- ON: Copies the type of alarm, alarm values, and relay (internal switch) setting.
- OFF: The copying of alarms is disabled.

Selecting copying of other items (COPY OTHER)

- ON: Copies setting average numbers in moving averages and measured data writing ON/OFF.
- OFF: The copying of other items is disabled.

Setting a copy-source channel

Sets a copy-source channel with up to three characters. For details on these characters, see the figure in Section 4-1, "Using the AUTO Display," on page 4-2.

Setting a destination channel to be copied

Sets a channel to which the setting data in the source channel are copied.

- When the COPY RANGE, COPY ALARM and COPY OTHER are set to ON, individual set data are copied.
- For the setting of a destination channel number, see Section 5.1, "Setting the Type of Input and Span," on page 5-2.
- It is not possible to copy data between measurement channels and computation channels.

Copying Data from a Computation Channel

When copying from an optional computation channel is carried out, the following data will be copied.

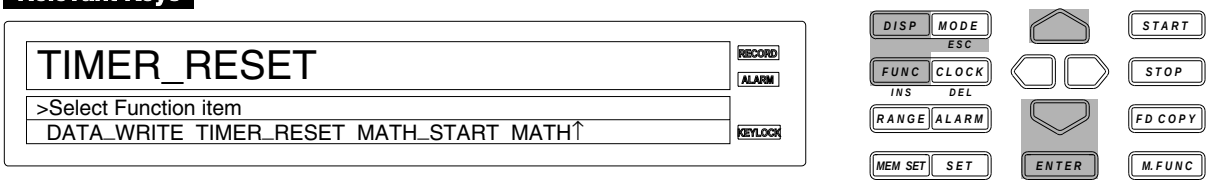
- When COPY RANGE is ON : Computation equation, tag
- When COPY ALARM is ON : Alarm
- When COPY OTHER is ON : measured data writing ON/OFF

Note

When writing the measured/computed data, you are not allowed to copy from channel to channel by setting COPY RANGE or COPY OTHER to "ON."

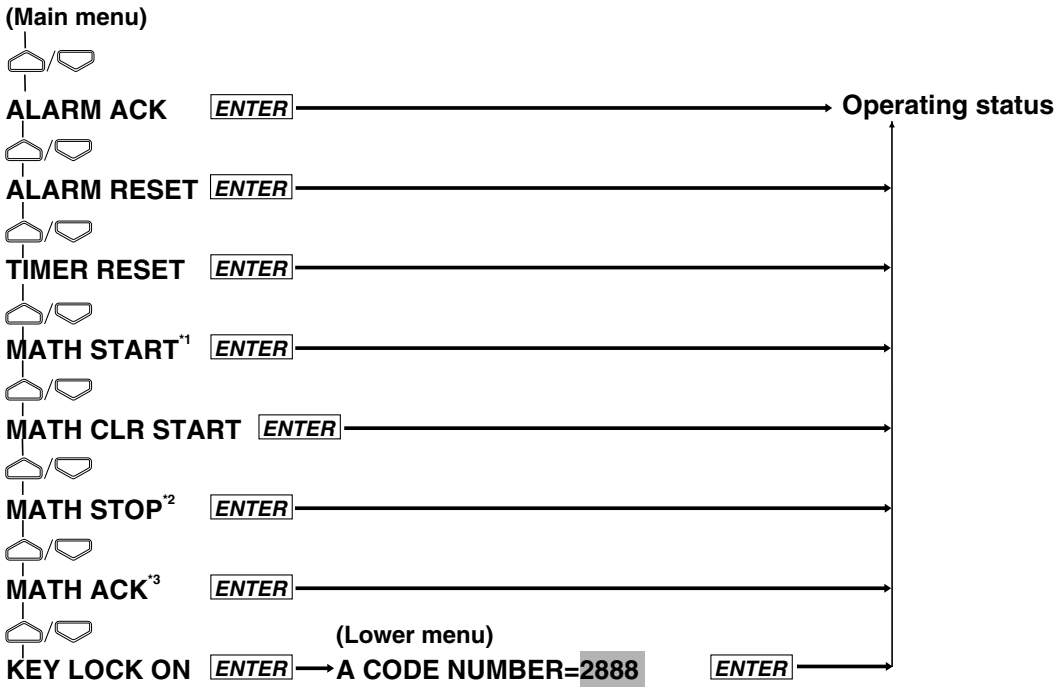
9.3 Alarm Acknowledgment, Alarm Reset, Timer Reset, and Keylock

Relevant Keys



Operating Procedure

- Press the FUNC key to enter the FUNC menu.
- To enter the FUNC menu from the [RANGE], [ALARM], [MEM SET], or [SET](SET3) menu, press the DISP key.
- Select/set using the ⏶⏷ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- There may be some menus that are not displayed by basic settings in Chapter 10.



*1: Displayed when computation is not in progress (i.e. when stopped).
*2: Displayed when computation is in progress (i.e. when started).
*3: Displayed only when incomplete measurement occurs during computation.

Note

If MATH is selected as a level action, MATH START, MATH CLR START and MATH STOP will not be displayed.

Explanation

Any of the following functions are executed by pressing the ENTER key. After that, the instrument returns to the operation mode.

Alarm acknowledgment (ALARM ACK)
- When the alarm display hold (ALARM HOLD), on page 10-4 is set to ON, the alarm acknowledgment menu appears.
- For the alarm display hold functions, see Section 2.4, "Alarm Function," on page 2-9.

Alarm reset (ALARM RESET)
- When the relay hold function (on page 10-7) is set to ON, the alarm reset menu appears.
- For the alarm reset functions, see Section 2.4, "Alarm Function," on page 2-9.

Timer reset (TIMER RESET)
- For the timer reset functions, see Section 2.6, "Other Functions," on page 2-11.

Computation start (MATH START)
- Starts computation. For details, refer to Chapter 12, "Executing Computation".

Computation clear start (MATH CLR START)
- Clears computation results and then re-starts computation.

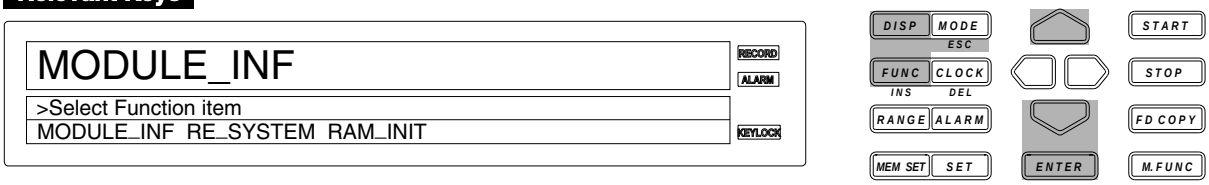
Computation stop (MATH STOP)
- Stops computation.

Clearing Incomplete Measurement Status (MATH ACK)
- Clears the status indication displayed due to incomplete measurement which occurred during computation.

Keylock function (KEY LOCK ON)
- For the keylock functions, see Section 2.6, "Other Functions," on page 2-11.
- The KEY LOCK ON is displayed after selecting the keylock (see page 10-13).
- Enter a password (A CODE NUMBER) and then press the ENTER key to actuate the keylock functions. The KEY LOCK OFF menu then appears.
- Reenter into the FUNC menu, select KEY LOCK OFF and then enter a password (A CODE NUMBER). Press the ENTER key to release the keylock functions. The menu returns to KEY LOCK ON.
- To set a password, see page 10-13.
- When the keylock functions are actuated, the "KEYLOCK" lights up.

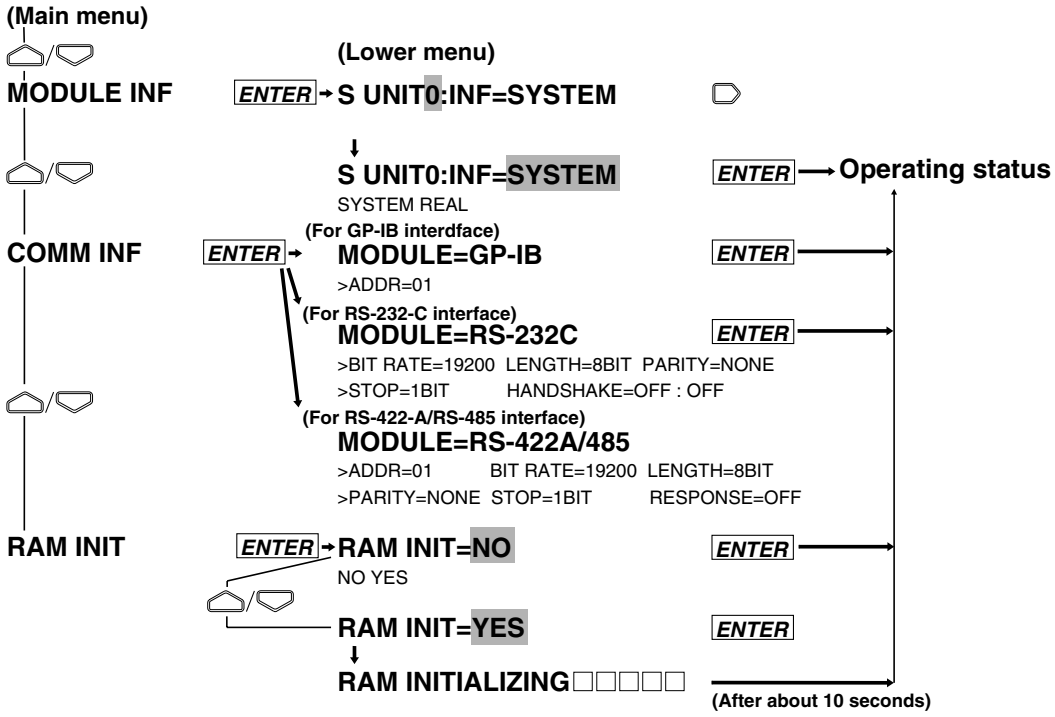
9.4 Displaying Module/Communications Information, and Initializing Information

Relevant Keys



Operating Procedure

- Press and hold the FUNC key for about three seconds to enter the FUNC3 menu.
- To enter the FUNC menu from the [RANGE], [ALARM], [MEM SET], or [SET] (SET3) menu, press the DISP key.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- There may be some menus that are not displayed by basic settings in Chapter 10.



Explanation

Any of the following functions are executed and displayed by pressing the ENTER key, the last key of the lower menu. After that, the instrument returns to the operation mode.

Displaying information set in the modules (MODULE INF)

- Selection of unit numbers (S UNIT)
  - Select I from the main unit or 0 to 5 from the subunit. For the stand-alone model, the unit number is fixed at 0.
  - The unit number that is not recognized for the system cannot be selected.
- Module information (INF)
  Displays the information in the module installed in the slot.
  - SYSTEM: Displays the information recognized as the system module.
  - REAL: Displays the real module information when the recognized system module is replaced by another one or removed.
  - If the SYSTEM displays information different from that of REAL module, the system must be configured (see page 3-32). Otherwise, an operation error may occur or the instrument may display measured values incorrectly.
  - The information on individual modules is displayed as follows:

Module	Display	ID inside the display ( )	Description
Input module	INPUT	00 to 3F	
DI/DO module	REMOTE	57	
Alarm module	RELAY	5C to 5F	
Communication module	COMM	48 to 4F	
Module not installed	------	FF	
Invalid module installed	======	FE	
Module error	XXXXXX	Displays error code (80 to FF).	
Retransmission module	OUTPUT	50 to 51	

Displaying communications information (COMM INF)

When the communication module is recognized as a system module, communications information is displayed. For details on the communication information, see Section 3-4 “Connecting the Interface Cables,” on page 3-9 or the separate DC100 Communication Interface User’s Manual (publication number IM DC100-11E).

Initialization (RAM INIT)

This initializes information other than the basic information set in Chapter 10 or calibration set in Chapter 13. For details on initial setting, see the appropriate sections and explanations. All the files in the internal RAM disk will be lost when the RAM is initialized.

- NO: Initialization not executed.
- YES: Initializes the information. It takes about ten seconds to initialize the information.

9.5 Fail/File Alarm Output, and Remote Control Signal Input

Function

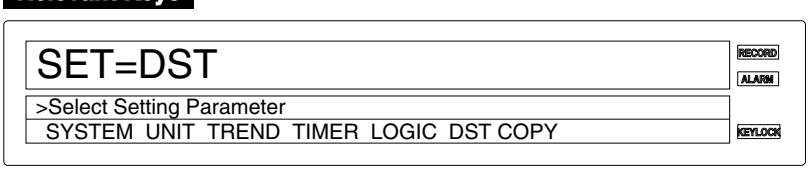
See Section 2.6, “Other Functions,” on page 2-12.

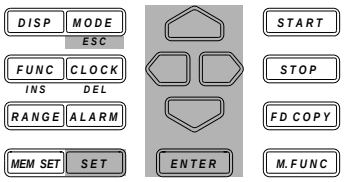
Connections and Notice

See Section 3.6, “Connecting the Signal Lines,” on page 3-15.

9.6 Summer/Winter Time

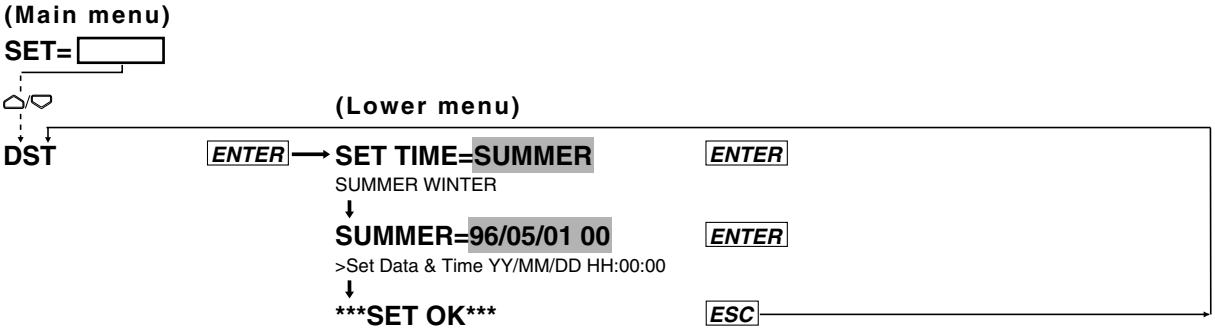
Relevant Keys





Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set ▭ using the ⌓ ⌔ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

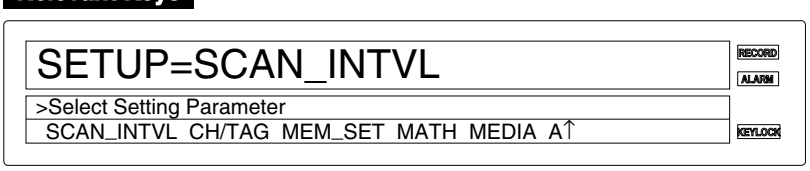


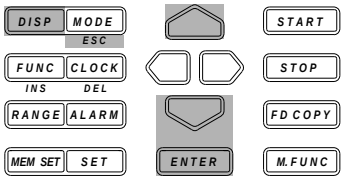
Explanation

Using this funcion the DC will automatically change its date and time to the summer time or winter time when appropriate.
If you specify SUMMER, the time will be ajusted to one hour later when the specified date and time is reached.
If you specify WINTER, the time will be ajusted to one hour earlier when the specified date and time is reached.
When the set time is reached, the setting will return to its intial value of 50/01/01 00.
The value of the years are as follows : 00 to 49 stand for the year 2000 to 2049, whereas 50 to 99 stand for the years 1950 to 1999.

10.1 Selecting Scan Interval

Relevant Keys





Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set using the keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.

(Main menu)

SET UP=

(Lower menu)

SCAN INTVL ENTER → **SCAN INTERVAL=0.5(sec)** ENTER

0.5 1 2 3 4 5 6 10 12 15 20 30 60

↓

*****SCAN INTVL SET***(End of setting)** ESC

Explanation

Selection of Scan Interval (SCAN INTVL)

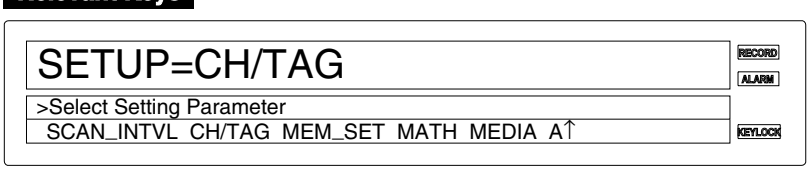
- Select 0.5, 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60 seconds as the interval.
- The default setting is 0.5 seconds.
- The shortest selectable scan interval varies with the setting of the number of input channels, A/D converter integration time, or filter ON/OFF. For details, see chapter 14.

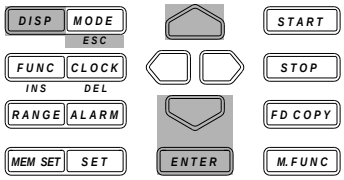
Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.
- If the writing period is not an integer multiple of the scan interval, the writing period is changed to INTVL when executing STORE.

10.2 Selecting Channel Number or Tag Indication

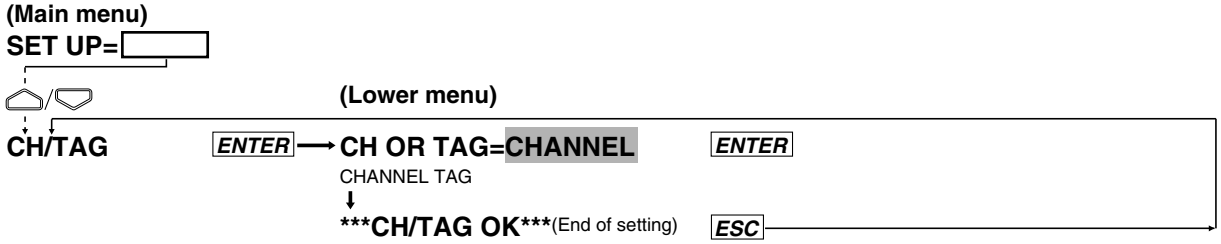
Relevant Keys





Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the ⏶⏷ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.



Explanation

Selection of Channel Number or Tag (CH OR TAG)

Select the call name for displaying the measured values of either CHANNEL or TAG.

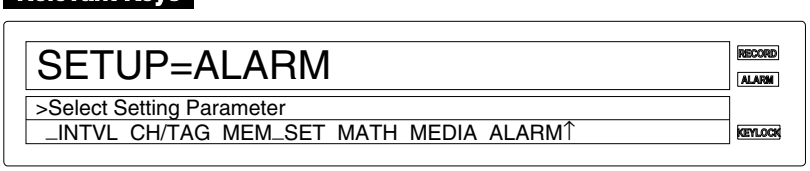
- Select either CHANNEL or TAG. However, if the TAG setting includes all spaces (vacant), the channel is displayed regardless of selection.
- The default setting is CHANNEL.
- For the TAG setting, see Section 8.5, “Setting Tag and Message” (page 8-7).

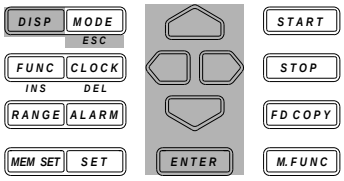
Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.

10.3 Select Alarm Interval/Hysteresis/Hold/A/D Converter Integration Time/Filter

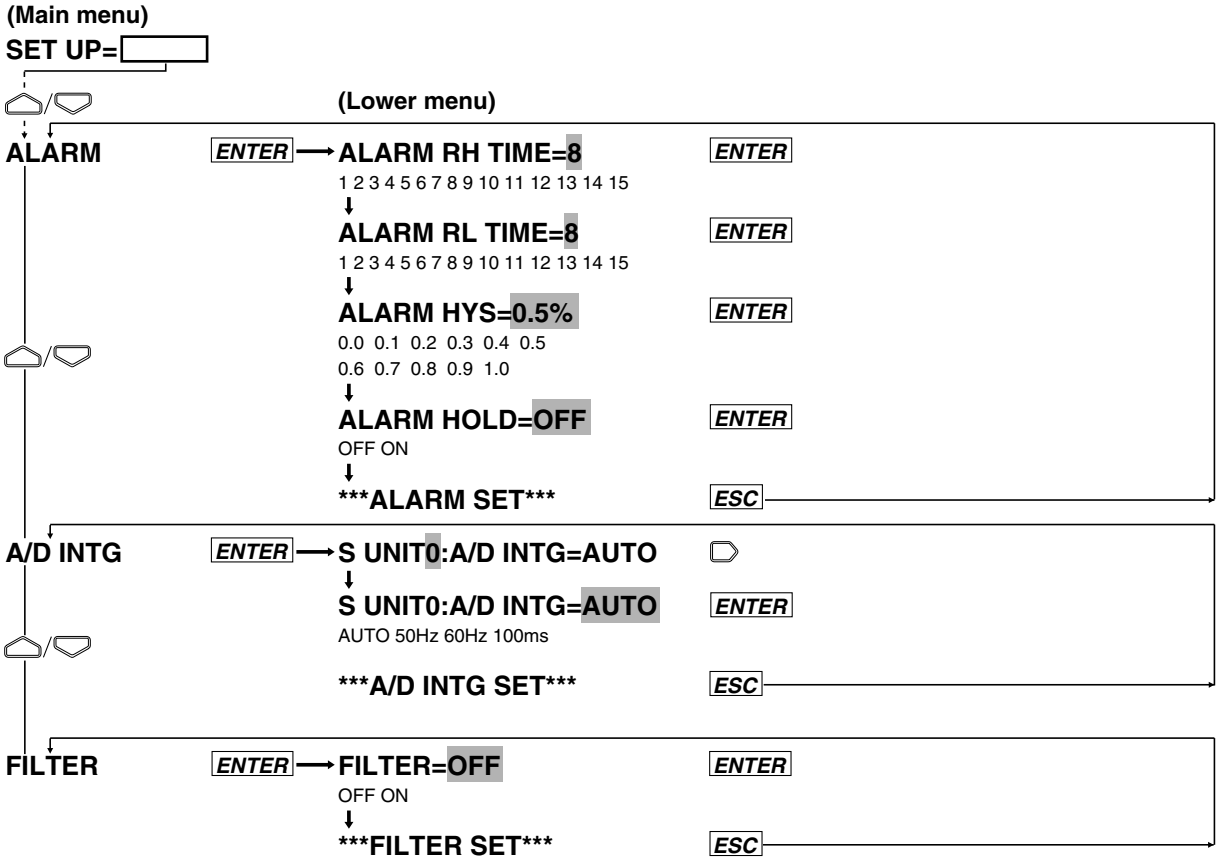
Relevant Keys





Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the △▽ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.



Explanation

Selection of Interval for High Limit of Rate-Of-Change Alarm (ALARM RH TIME)

Set the number of measurement repeats in "Interval = measurement interval x measurement repeats."

- Select 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15.
- The default setting is 8.

Selection of Interval for Low Limit of Rate-Of-Change Alarm (ALARM RL TIME)

- The same selection method as the above.

Selection of Alarm Hysteresis (ALARM HYS)

Applied to high/low limit alarm.

- Select 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 or 1.0%.
- The default setting is 0.5%.

Selection of Alarm Display Hold (ALARM HOLD)

Select whether the alarm display is held or not when the alarm is reset.

- OFF: hold
- ON: not hold
- The default setting is OFF.

Selection of A/D Converter Integration Time (A/D INTG)

Select each A/D converter integration time for each unit. Select it from the following:

- AUTO: the frequency of 50/60 Hz is automatically switched corresponding to the power frequency of this instrument.
  However, AUTO does not function on the stand-alone DC power supply model nor on the extension type using the subunit of the DC power supply model.
- 50 Hz: the integration time is set to 20 ms (50 Hz).
- 60 Hz: the integration time is set to 16.7 ms (60 Hz).
- 100 ms: the integration time is set to 100 ms (10 Hz)
- The default setting is AUTO. However, if the instrument is a stand-alone DC power supply model, the default setting is 20 ms (50 Hz).

Selection of Filter (FILTER)

Select whether the input filter is operated or not. Select it from the following:

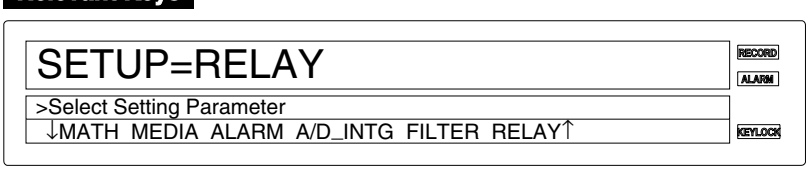
- OFF: Not operated
- ON: Operated
- The default setting is OFF.

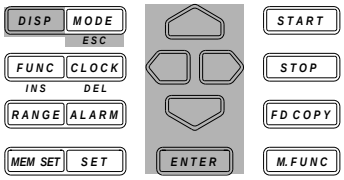
Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.

10.4 Setting Operation Mode of Relay/Internal Switch

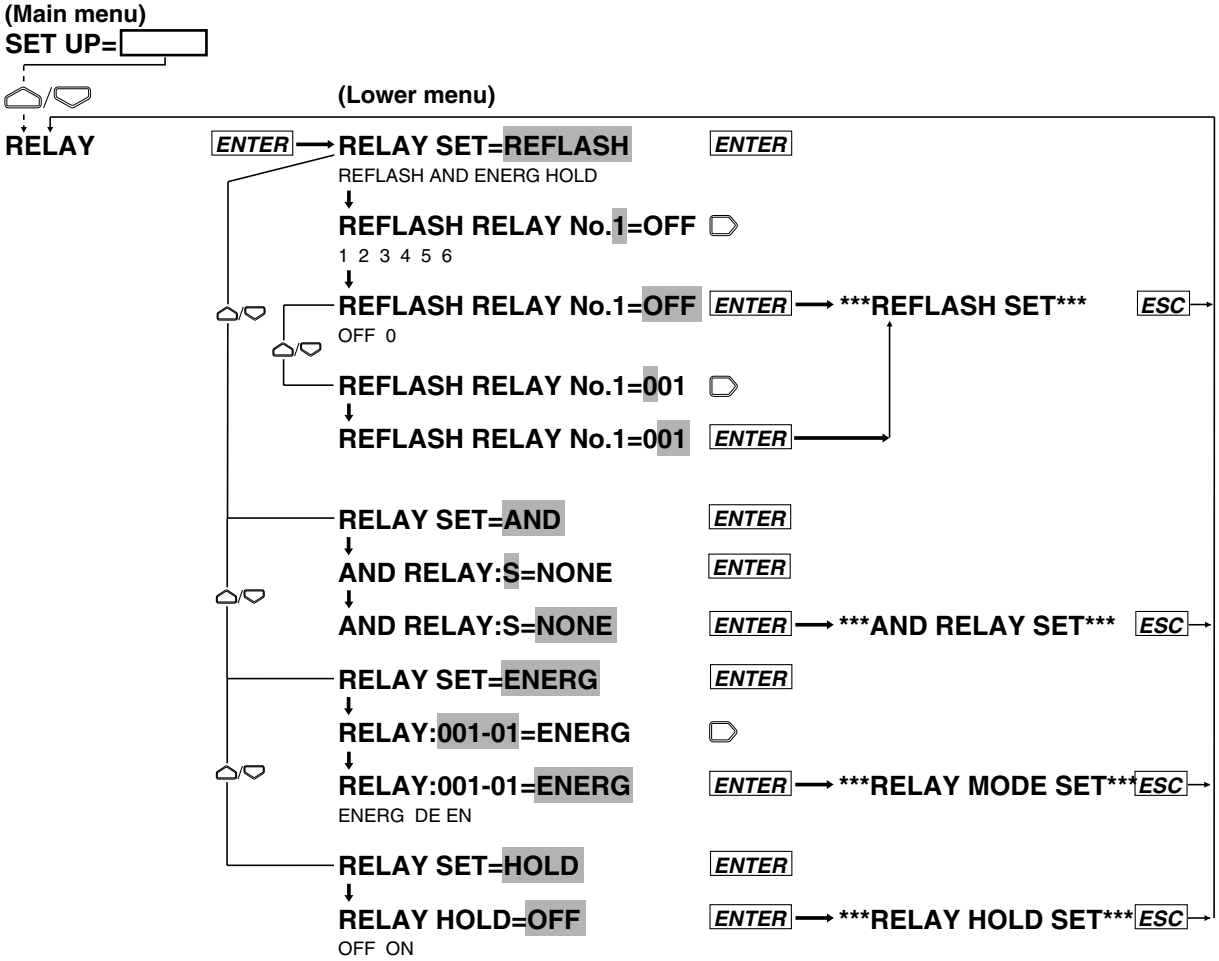
Relevant Keys





Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the △▽ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.



Explanation

The following operation mode is set to the alarm output relays and the internal switches. There are menus which cannot be displayed unless the alarm module or the DI/DO module is mounted and recognized as the system of this instrument. Also, there are menus which cannot be set to the internal switches.

Setting Re-failure or Re-alarm (REFLASH)

This is a menu which cannot be displayed unless the alarm module or the DI/DO module is mounted and recognized as the system of this instrument. Setting for the internal switches cannot be done. REFLASH setting is available for up to six relays.

- **Selection of REFLASH number (REFLASH RELAY No.)**
  Select from 1 to 6.
- **Setting of REFLASH relay**
  - OFF: not set.
  - Setting with numerals for 3 characters:
    - The first character is the unit number.
    - For the second and third characters, a number from 01 to 60 can be set but the effective setting range is as shown in the following examples: (Check which slot the alarm module or the DI/DO module is mounted in using the model number of mounted modules and their mounted positions. Slot numbers are set in the order of slot 0, slot 1, ... as viewed facing the rear from right to left.)
      Ex. 1: When the alarm module is mounted in slot 3: 31 to 40
      Ex. 2: The DI/DO module is mounted in slot 4: 41 to 42
  - The default setting is OFF.
  - After REFLASH setting, when the alarm module or the DI/DO module becomes unrecognized as the system of this instrument, the relay setting becomes OFF.

Setting AND/OR (AND)

This can be set either to the relays or the internal switches. However, the relay cannot be set unless the alarm module or DI/DO module is mounted and recognized as the system of this instrument.

- **Selection of Internal Switch/Relay**
  - S: internal switch is set.
  - I, 0 to 5: relay is set. For the stand-alone model, setting values other than 0 cannot be selected.
  - The default setting is S.
- **Setting AND/OR**
  The relays or the internal switches are set to AND in up to the set range and set to OR in the range exceeding the set range.
  - For internal switches: set from 01-01 to 01-60.
  - For one alarm module: 01-01 to 01-60 can be displayed. However, if this option is installed in slot 4, 01-41 to 01-50 is the effective setting range.
  - For one DI/DO module: 01-01 to 01-60 can be displayed. However, if this option is installed in slot 5, 01-51 to 01-52 is the effective setting range.
  - For two alarm modules: 01-01 to 01-60 can be displayed. However, if one module is installed in slot 3 and another is installed in slot 5, 01-31 to 01-60 is the effective setting range. No relay is in the range from 01-41 to 01-50.
  - In either case above, if all are to be set to OR or reset, set “NONE.”
  - The default setting is NONE.

Setting Energizing/De-energizing (ENERG)

This is a menu which cannot be displayed unless the alarm module or the DI/DO module is mounted and recognized as the system of this instrument. The internal switches cannot be set.

- **Relay Setting**
  Set the object relays from one number relay (first relay) to another number relay (end relay). Set it under the condition that the first relay number ≤ end relay number.
  - First relay number:
    - The first character is a unit number.
    - For the second and third characters, a number from 01 to 60 can be set but the effective setting range is as shown in the following examples: (Check which slot the alarm module or the DI/DO module is mounted in using the model number of mounted modules and their mounted positions. Slot numbers are set in the order of slot 0, slot 1, ... as viewed facing the rear from right to left.)
      Ex. 1: When the alarm module is mounted in slot 3: 31 to 40
      Ex. 2: The DI/DO module is mounted in slot 4: 41 to 42
  - End relay number: The same settings of the second or third characters in the first relay number.
  - The default setting is 001-01.
- **Selection of energizing/de-energizing**
  - ENERG: energizing
  - DE EN: de-energizing
  - The default setting is ENERG.

Setting Relay Hold (HOLD)

This is a menu which cannot be displayed unless the alarm module or the DI/DO module is mounted and recognized as the system of this instrument. However, the internal switches are set simultaneously with relays.

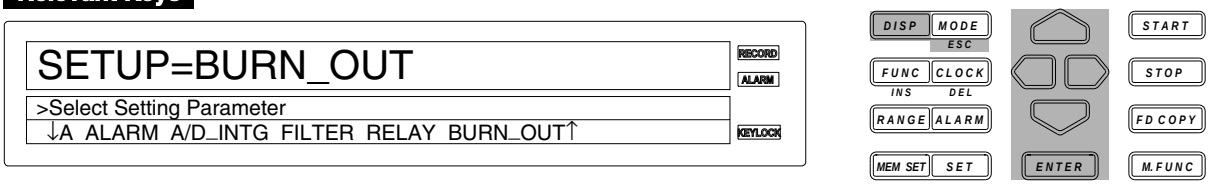
- OFF: No relays/internal switches hold.
- ON: all relays/internal switches hold.
- The default setting is OFF.

Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.

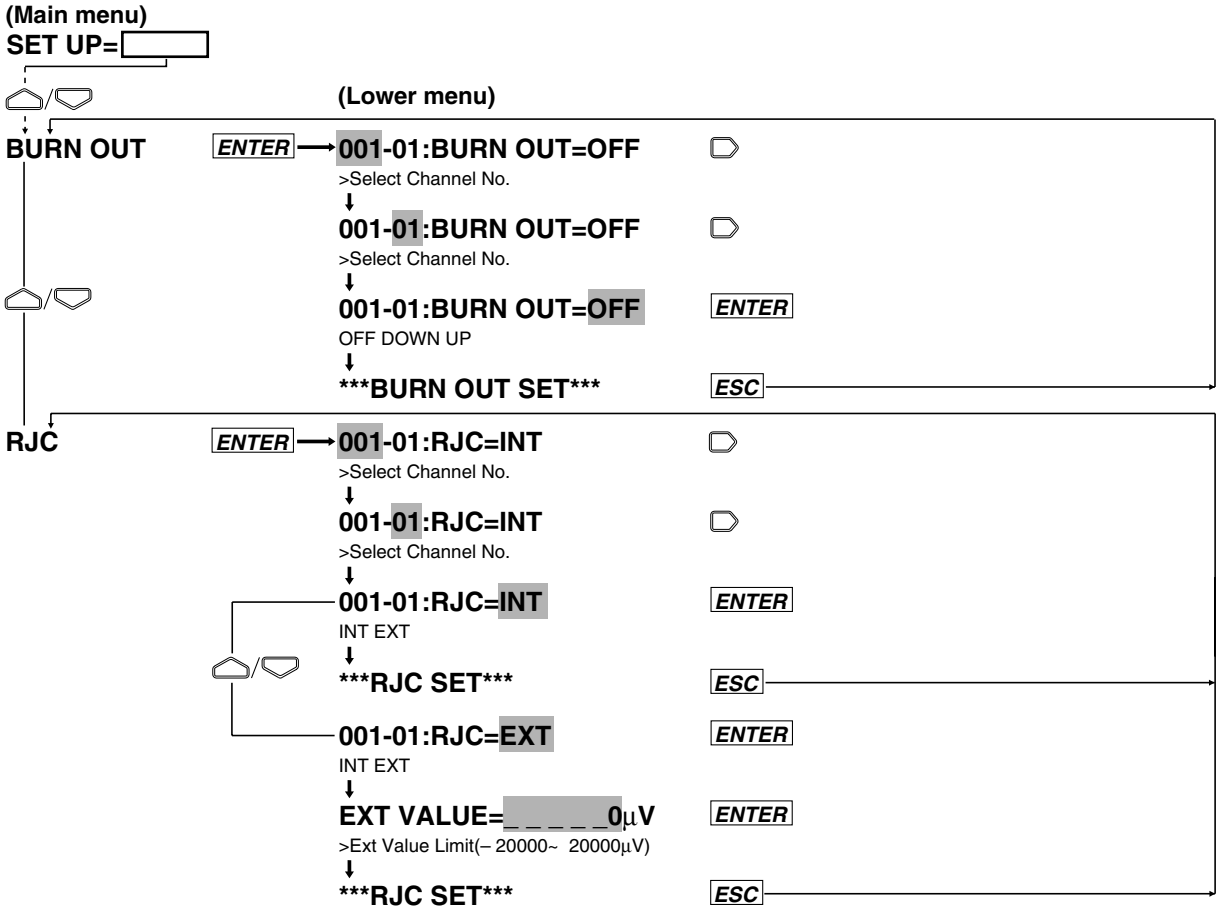
10.5 Setting Burn-out/Reference Junction Compensation

Relevant Keys



Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the ◠◡ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.



Explanation

Setting Burn-out (BURN OUT)

Set the overtravel position for each channel when burn-out occurs.

- OFF: The burn-out function is not actuated.
- DOWN: The output extends to the minimum value of the span.
- UP: The output extends to the maximum value of the span.
- The default setting is OFF.

Setting Reference Junction Compensation (RJC)

Set either the internal or the external compensation for each channel.

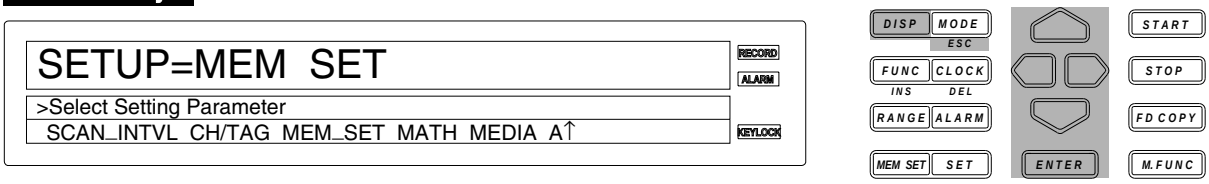
- INT: internal compensation is performed.
- EXT: external compensation is performed. For external compensation, set the voltage to be compensated.
  Voltage to be externally compensated: set in the range of -20000 to 20000 μV.
- The default setting is INT.

Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.

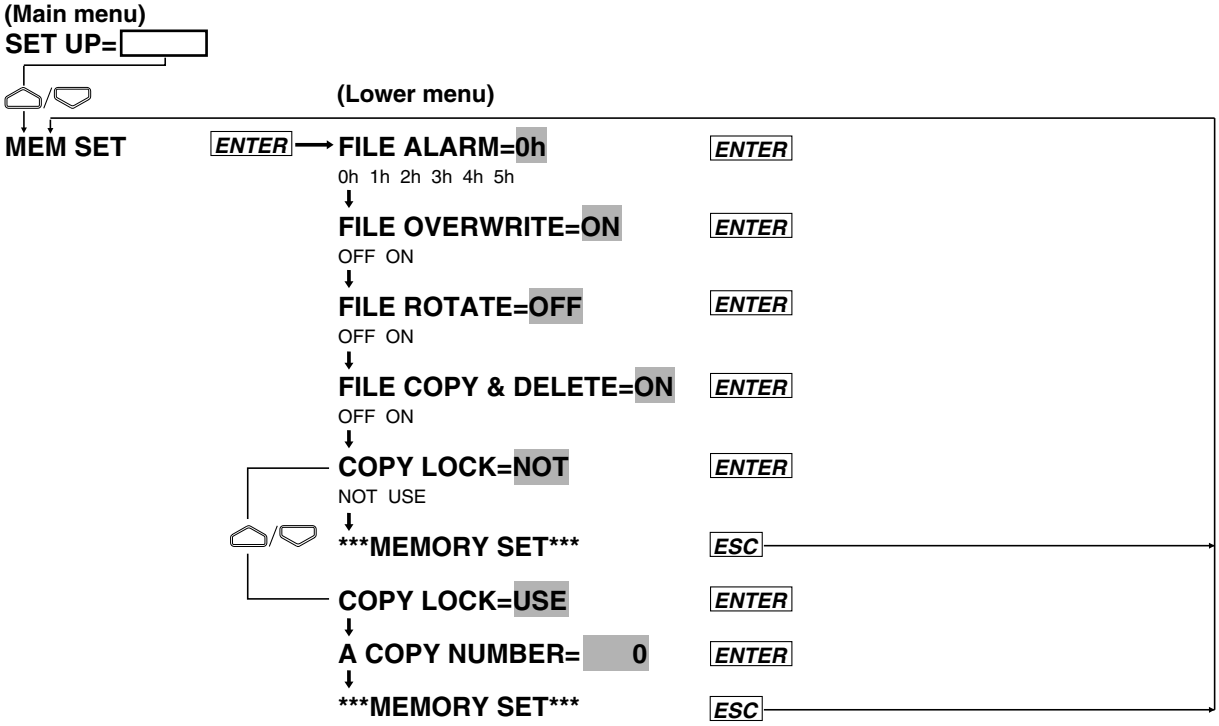
10.6 Setting File Alarm Time, File Overwriting, or File Cancellation

Relevant Keys



Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set using the ▲▼ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.



Explanation

Setting the File Alarm Time (FILE ALARM)

- This outputs a file alarm from a relay when the remaining file capacity becomes below the one corresponding to the specified time while the measured/computed data are being written in the built-in RAM disk. Select the remaining time from the following:
  0h: Outputs an alarm when file has been created (file is closed).
  1h, 2h, 3h, 4h, or 5h: Outputs an alarm when the remaining time reaches the specified time.
- The default setting is "1h."

Overwriting a File with the Same Name (FILE OVERWRITE)

- When measured/computed data are written, if there is a file with the same name in the built-in RAM disk, set whether to overwrite the file or not.
  ON: Overwrites the file.
  OFF: Stops writing.

Continuing of saving operation when saving with division method (FILE ROTATE)

- If saving with the division method and the saving operation is REPEAT, and if memory becomes full and so there is no file creation capacity, the saving operation is continued by deleting the file with the oldest date and time.
  ON: Continues saving operation by deleting a file.
  OFF: Terminates the saving operation.
- The default setting is OFF.

File Deletion When Copying a File (FILE COPY & DELETE)

- Set whether a file in the copying source is to be deleted or not when copying a measured/computed data file to a floppy disk.
  ON: Delete.
  OFF: Do not delete.
- The default setting is OFF.
- ASCII-converted copying is not supported.

Selecting Use or Nonuse of Copy Lock (COPY LOCK)

- Whether the lock function is used or not is set when measured/computed data are to be copied on a floppy disk.
  NOT: Not used.
  USE: Used.
- The default setting is NOT.
- Copy lock supports both copying with the FD COPY key and with ASCII-conversion.

Setting Password in Copy Locking (A COPY NUMBER)

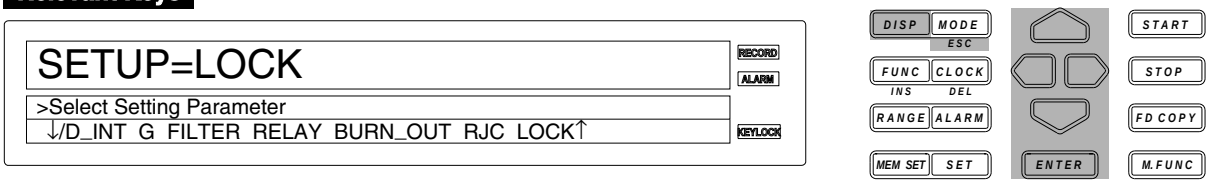
A password is set if copy locking is used.
The default setting is "0."

Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.

10.7 Setting Key Lock

Relevant Keys



Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the △▽ keys.
- If exiting the following lower menu srtting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.

(Main menu)
SET UP=▭

△/▽

(Lower menu)

LOCK — ENTER → **KEY LOCK=NOT** — ENTER
NOT USE
↓
△/▽ *****KEY LOCK SET***** — ESC
KEY LOCK=USE — ENTER
NOT USE
↓
START KEY=LOCK — ENTER
FREE LOCK
↓
STOP KEY=LOCK — ENTER
FREE LOCK
↓
CLOCK KEY=LOCK — ENTER
FREE LOCK
↓
FUNC KEY=LOCK — ENTER
FREE LOCK
↓
FD COPY KEY=LOCK — ENTER
FREE LOCK
↓
M.FUNC KEY=LOCK — ENTER
FREE LOCK
↓
A CODE NUMBER=_ _ _0 — ENTER
(Set the password)
↓
*****KEY LOCK SET***** — ESC

Explanation

Selection of Use or Nonuse of Key Lock

Select whether the key lock function is used or not used.

- NOT: the key lock function cannot be used.
- USE: the key lock function can be used. The menu "KEY LOCK ON" is displayed in the FUNC menu and key lock can be executed. For details, see Section 9.3, "Alarm Acknowledgment, Alarm Reset, Timer Reset, and Keylock" (page 9-15).
- The default setting is NOT.

Selection of Making Key Lock Ineffective

Even if key lock is executed, the turning on/off of the power switch, DISP/MODE key operation and cursor key operation are effective. Other than the above, whether operation of the following keys is made effective or locked can be selected.

- Selectable keys
  START, STOP, CLOCK, FUNC, FD COPY, and M.FUNC
- Choice
  - FREE: made effective.
  - LOCK: locked.
  - The default setting is LOCK.

Setting Password (A CODE NUMBER)

Set a password for executing/resetting key lock.

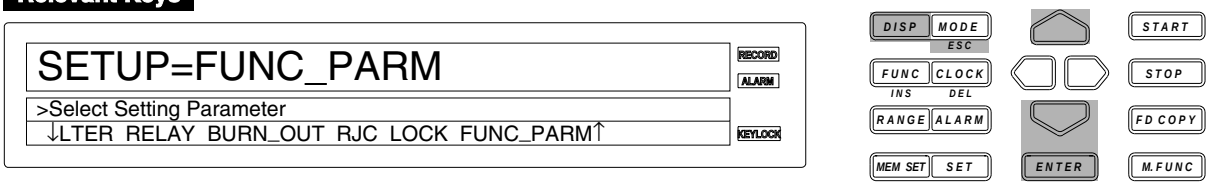
- Can be set in the range of 0 to 9999.
- The default setting is 0.

Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.

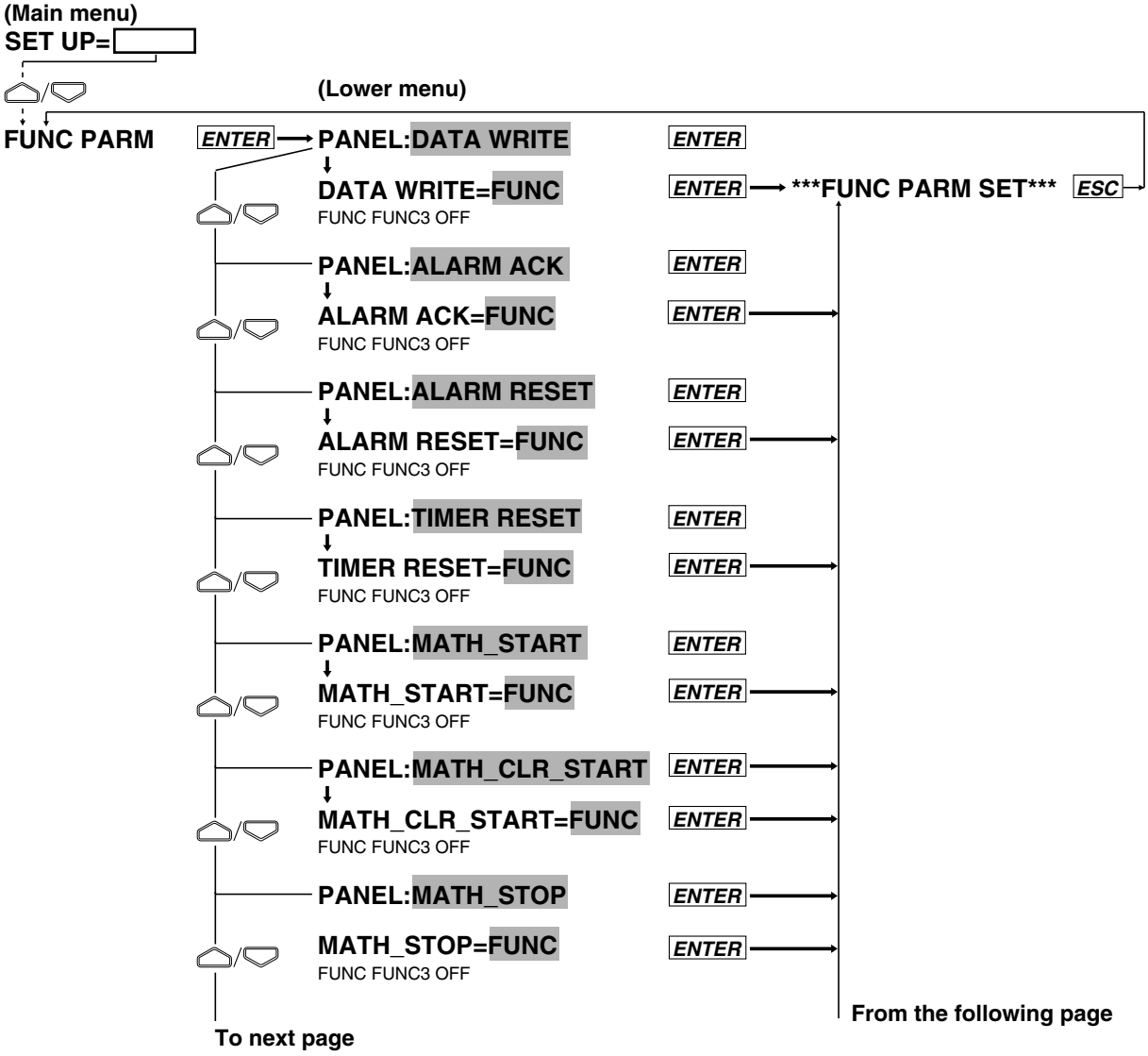
10.8 Setting FUNC/FUNC3 Menu

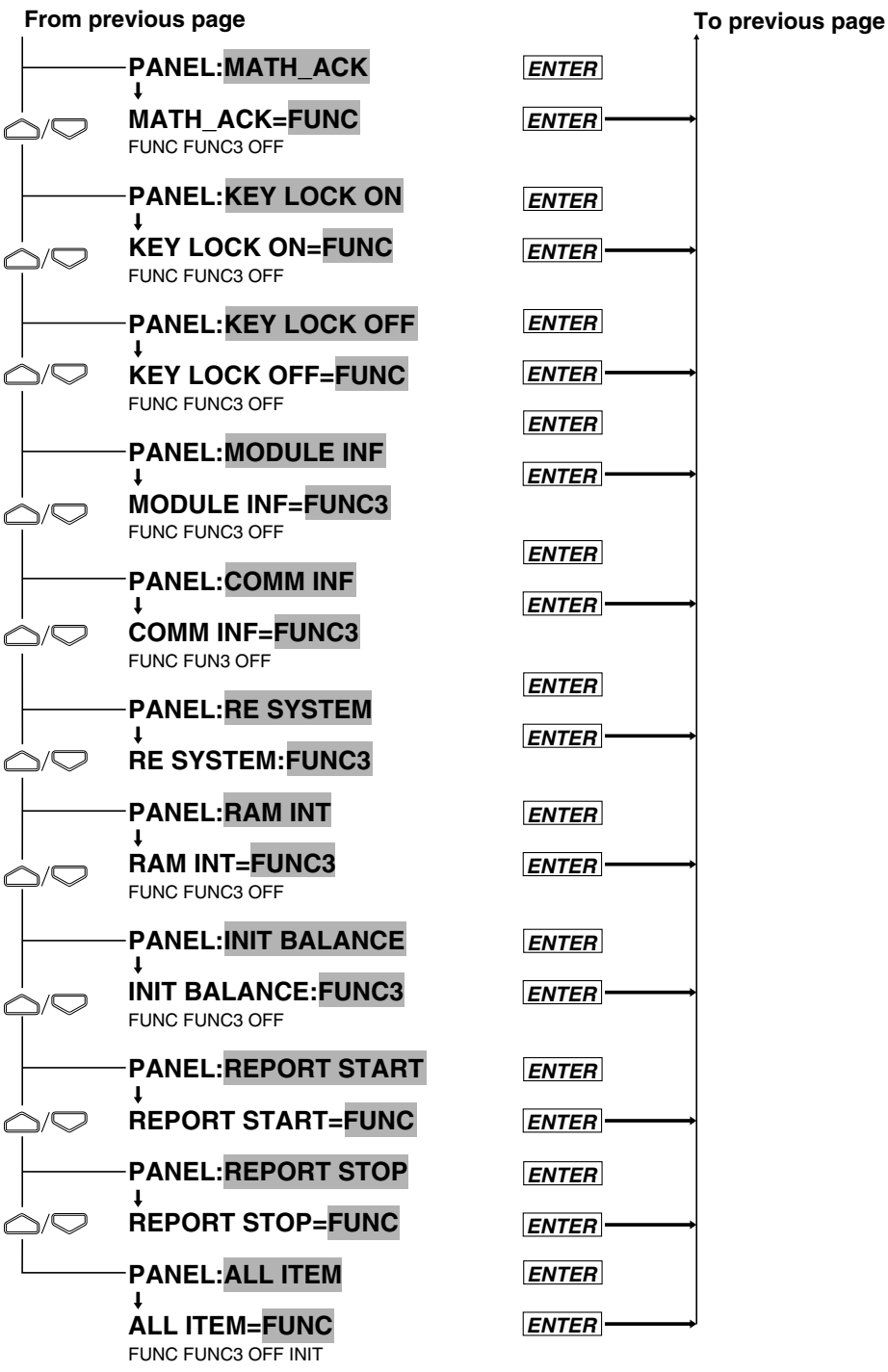
Relevant Keys



Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the △▽ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.




From previous page
To previous page
PANEL:MATH_ACK
MATH_ACK=FUNC
FUNC FUNC3 OFF
PANEL:KEY LOCK ON
KEY LOCK ON=FUNC
FUNC FUNC3 OFF
PANEL:KEY LOCK OFF
KEY LOCK OFF=FUNC
FUNC FUNC3 OFF
PANEL:MODULE INF
MODULE INF=FUNC3
FUNC FUNC3 OFF
PANEL:COMM INF
COMM INF=FUNC3
FUN3 OFF
PANEL:RE SYSTEM
RE SYSTEM:FUNC3
PANEL:RAM INT
RAM INT=FUNC3
FUNC FUNC3 OFF
PANEL:INIT BALANCE
INIT BALANCE:FUNC3
FUNC FUNC3 OFF
PANEL:REPORT START
REPORT START=FUNC
PANEL:REPORT STOP
REPORT STOP=FUNC
PANEL:ALL ITEM
ALL ITEM=FUNC
FUNC FUNC3 OFF INIT
ENTER

Explanation

Setting FUNC/FUNC3 (FUNC PARM)

Select the menu to be displayed by pressing the FUNC key whether in the FUNC menu or the FUNC3 menu. The FUNC menu is displayed by pressing the FUNC key at a touch and the FUNC3 menu is displayed by pressing the FUNC key for about 3 seconds continuously.

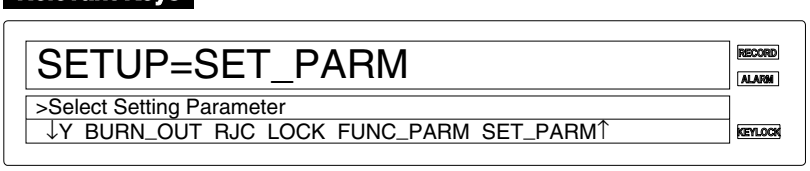
- Select any of the following:
  - FUNC: displayed in the FUNC menu.
  - FUNC3: displayed in the FUNC3 menu.
  - OFF: not displayed in either menu.
- The default setting is as shown in the operating procedure diagram on pages 10-14 and 10-15.
- The last operation menu, "PANEL:ALL ITEM" is the menu that globally sets all menus. However, the selection of "INIT" selects the default setting.
- The "COMM INF" menu is displayed if the communication module is mounted and recognized as the system of this instrument (see page 9-17).
- The "INIT BALANCE" menu is displayed if the strain input module is mounted and recognized as the system of this instrument (see page 9-17).

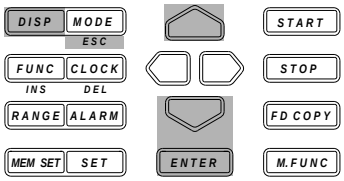
Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.
- Different menu items may be displayed depending upon the optional function(s) installed on the DC100 and the corresponding system configuration.

10.9 Setting SET/SET3 Menu

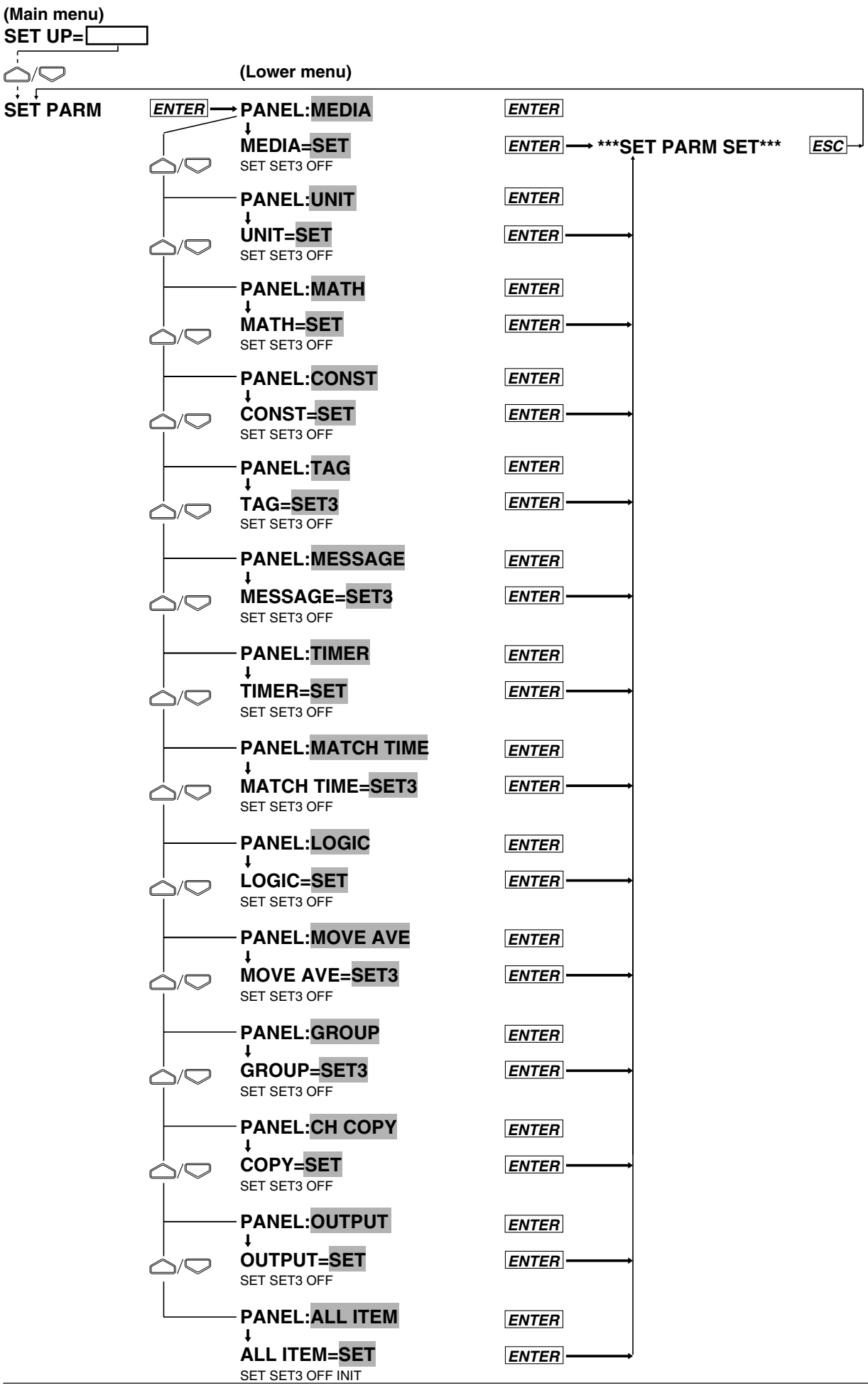
Relevant Keys





Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▬ using the ⌓ ⌔ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.


(Main menu)
SET UP=
(Lower menu)
SET PARM
ENTER
PANEL:MEDIA
MEDIA=SET
SET SET3 OFF
PANEL:UNIT
UNIT=SET
SET SET3 OFF
PANEL:MATH
MATH=SET
SET SET3 OFF
PANEL:CONST
CONST=SET
SET SET3 OFF
PANEL:TAG
TAG=SET3
SET SET3 OFF
PANEL:MESSAGE
MESSAGE=SET3
SET SET3 OFF
PANEL:TIMER
TIMER=SET
SET SET3 OFF
PANEL:MATCH TIME
MATCH TIME=SET3
SET SET3 OFF
PANEL:LOGIC
LOGIC=SET
SET SET3 OFF
PANEL:MOVE AVE
MOVE AVE=SET3
SET SET3 OFF
PANEL:GROUP
GROUP=SET3
SET SET3 OFF
PANEL:CH COPY
COPY=SET
SET SET3 OFF
PANEL:OUTPUT
OUTPUT=SET
SET SET3 OFF
PANEL:ALL ITEM
ALL ITEM=SET
SET SET3 OFF INIT
ENTER
SET PARM SET
ESC

Explanation

Setting SET/SET3 (SET PARM)

Select the menu to be displayed by pressing the SET key whether in the SET menu or the SET3 menu. The SET menu is displayed by pressing the SET key at a touch and the SET3 menu is displayed by pressing the SET key for about 3 seconds continuously.

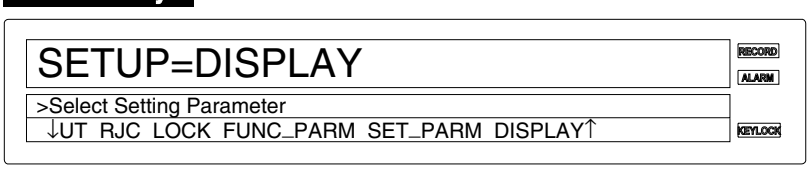
- Select any of the following:
  - SET: displayed in the SET menu.
  - SET3: displayed in the SET3 menu.
  - OFF: not displayed in either menu.
- The default setting is as shown in the operating procedure diagram on pages 10-18.
- The last operation menu, "PANEL:ALL ITEM," is the menu that globally sets all menus. However, the selection of "INIT" selects the default setting.

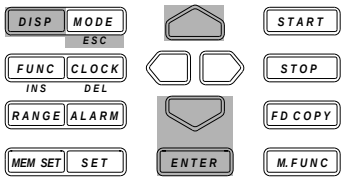
Note

- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.
- Different menu items may be displayed depending upon the optional function(s) installed on the DC100 and the corresponding system configuration.
- To set the retransmission setting in SET/SET3 menu, select "SET' or "SET3" in "OUTPUT."

10.10 Selecting Display Update Interval, Registering Details Set/Selected with SET UP Menu, and Terminating SET UP Menu

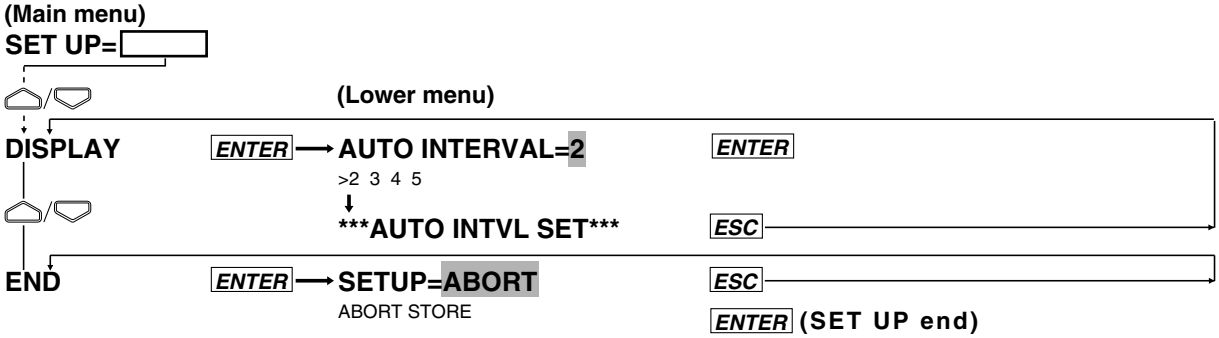
Relevant Keys





Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the ⏢ ⏣ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.



Explanation

Selection of Display Update Period (DISPLAY)

Select the display update interval when the operation display mode in the display is AUTO.

- Select 2, 3, 4, or 5 seconds.
- The default setting is 2 seconds.

Registration/Abortion of Setting/Selection Details and Termination of SET UP menu (END)

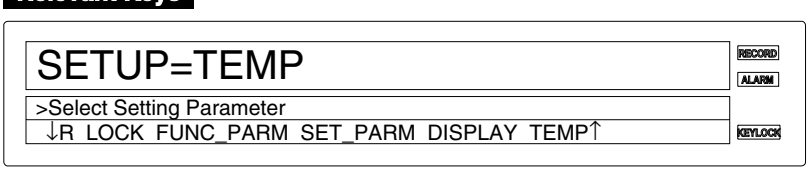
In order to make the details set/selected in the SET UP menu effective, a registering operation is necessary. In contrast, the status can also be brought to that before setting/selection without registration (abort). Terminate the SET UP menu after registering or aborting operation.

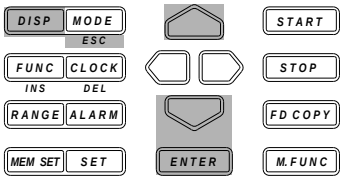
- ABORT: Registration is aborted and the SET UP menu is terminated.
- STORE: After registration, the SET UP menu is terminated.
- The default setting is ABORT.

Select the END menu, then press the ENTER key. The operation display mode is reached about 10 seconds after pressing the ENTER key.

10.11 Selecting the Temperature Unit from °C or °F (option)

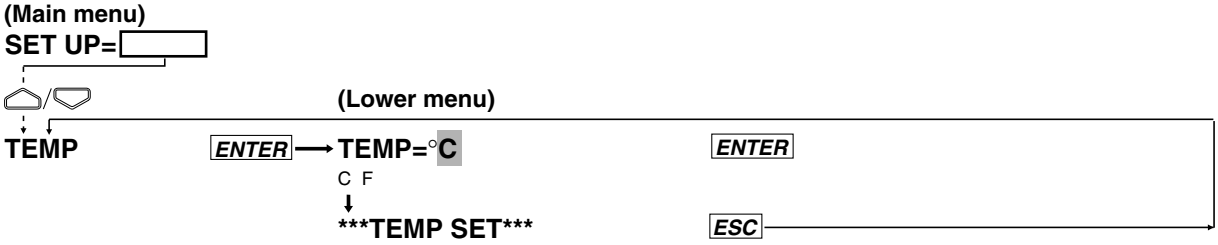
Relevant Keys





Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. The main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be saved when you reach the final display of that setting.



Selecting the temperature unit (TEMP)

The temperature unit can be selected from the following;

- °C which is the initial value, or
- °F

Note

- In the User's manual all functions and operations are explained using the °C unit. When using the °F unit, replace the °C unit with the °F unit. For the measurement range/measurement accuracy and maximum resolution in case of using the °F range, refer to the following table as a replacement of the one on page 14-11.
- Measurement range: Refer to the following table;
- Measurement accuracy/maximum resolution: Replace the values using the following formula
  °F value = {(°C value x 9)/5} + 32
- When changing the temperature unit as descibred above, other settings will be initialized at the same time and therefore, all settings need to be done again. This initialization will be the same initialization as described on page 9-17.
- In order to make the set or selected contents effective, the contents must be registered. For details, see page 10-20.
- To return from the SET UP menu to the operation display mode, select END in the main menu. For details, see page 10-20.

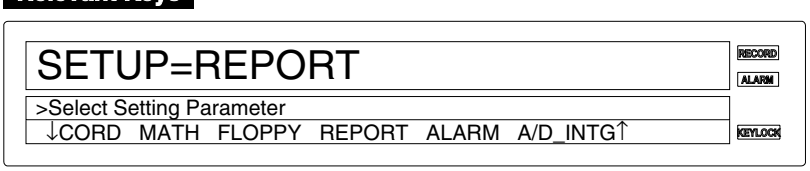
Measurement ranges for temperature measurements when using the unit °F

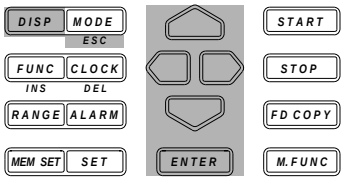
Input	Type		Measurement Range
TC (Note that accuracy of reference junction compensation is not considered.)	R	*1	32 to 3200°F
	S	*1	32 to 3200°F
	B	*1	32 to 3308°F
	K	*1	–328 to 2498°F
	E	*1	–328.0 to 1472.0°F
	J	*1	–328.0 to 2012.0°F
	T	*1	–328.0 to 752.0°F
	L	*2	–328.0 to 1652.0°F
	U	*2	–328.0 to 752.0°F
	N	*3	32 to 2372°F
	W	*4	32 to 4199°F
	KPvsAu7Fe		0.0 to 300.0K
RTD	Pt100(1 mA)	*5	–328.0 to 1112.0°F
	Pt100(2 mA)	*5	–328.0 to 482.0°F
	JPt100(1 mA)	*5	–328.0 to 1022.0°F
	JPt100(2 mA)	*5	–328.0 to 482.0°F
	Pt50(2 mA)	*5	–328.0 to 1022.0°F
	Ni100(1 mA) SAMA	*6	–328.0 to 482.0°F
	Ni100(1 mA)DIN	*6	–76.0 to 356.0°F
	Ni120(1 mA)	*7	–94.0 to 392.0°F
	J263*B		0.0 to 300.0K
	Cu10 GE	*8	–328.0 to 572.0°F
	Cu10 L&N	*8	
	Cu10 WEED	*8	
	Cu10 BAILEY	*8	
High resolution RTD	Pt100(1 mA)	*5	–220.0 to 302.0°F
	Pt100(2 mA)	*5	–94.0 to 158.0°F
	JPt100(1 mA)	*5	–220.0 to 302.0°F
	JPt100(2 mA)	*5	–94.0 to 158.0°F

*1 :R, S, B, K, E, J, T :ANSI, IEC 584, DIN IEC 584, JIS C 1602-1981
*2 :L :Fe-CuNi, DIN43710, U :Cu-CuNi, DIN 43710
*3 :N :Nicrosil-Nisil, IEC 584, DIN IEC 584
*4 :W :W·5%RE-W·26%Re (Hoskins Mfg Co)
*5 :Pt50 :JIS C 1604-1981, JIS C 1606-1986
Pt100 :JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751
JPt100 :JIS C 1604-1981, JIS C 1606-1989
*6 :SAMA/DIN
*7 :McGRAW EDISON COMPANY
*8 :Ranges to which accuracy applies :
Cu10 GE :–119.9 to 338.0°F, Cu10 L&N :–103.0 to 302.0°F,
Cu10 WEED :–4.0 to 482.0°F, Cu10 BAILEY :–4.0 to 482.0°F

10.12 Setting Conditions for Creating Reports

Relevant Keys

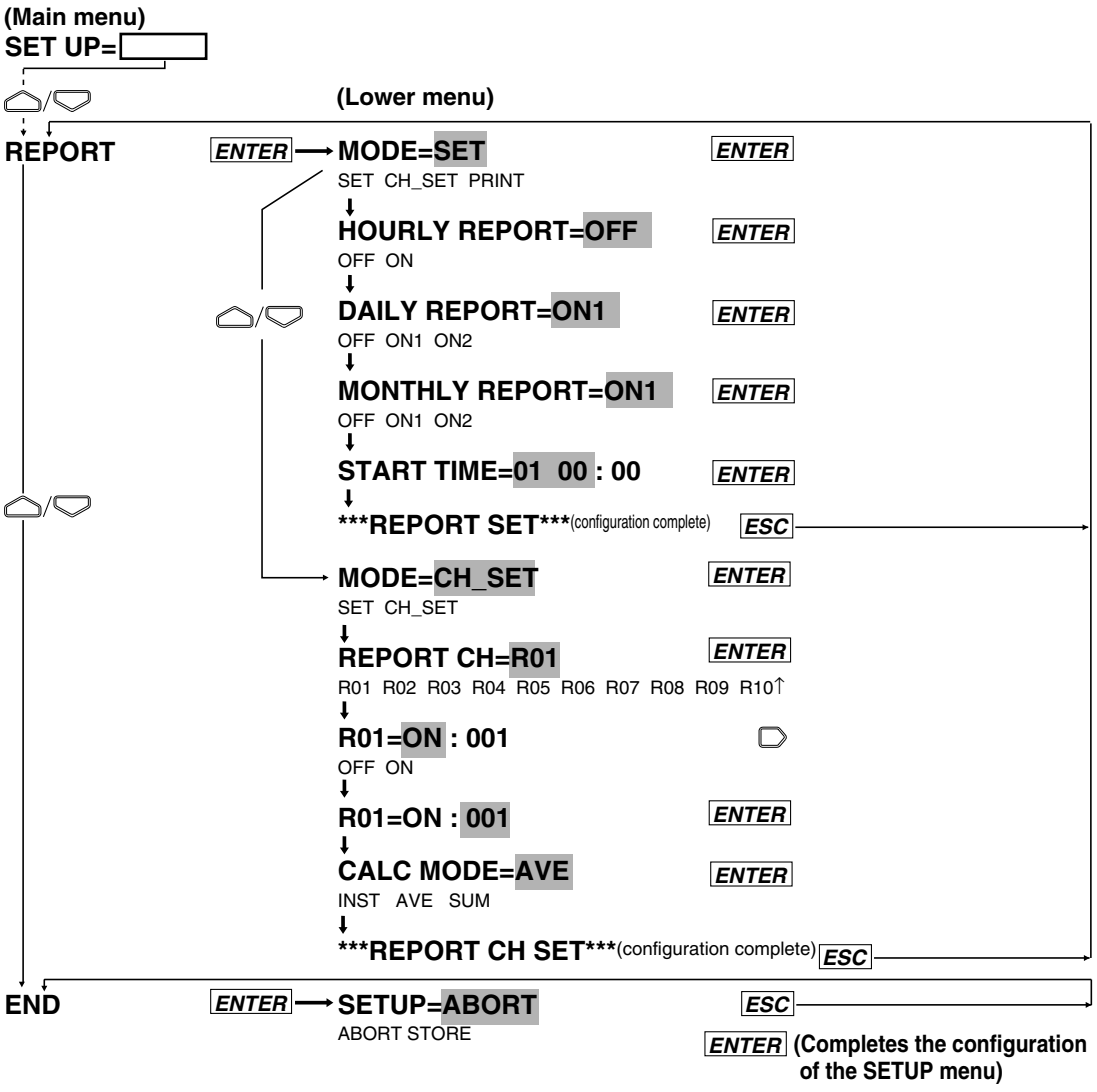




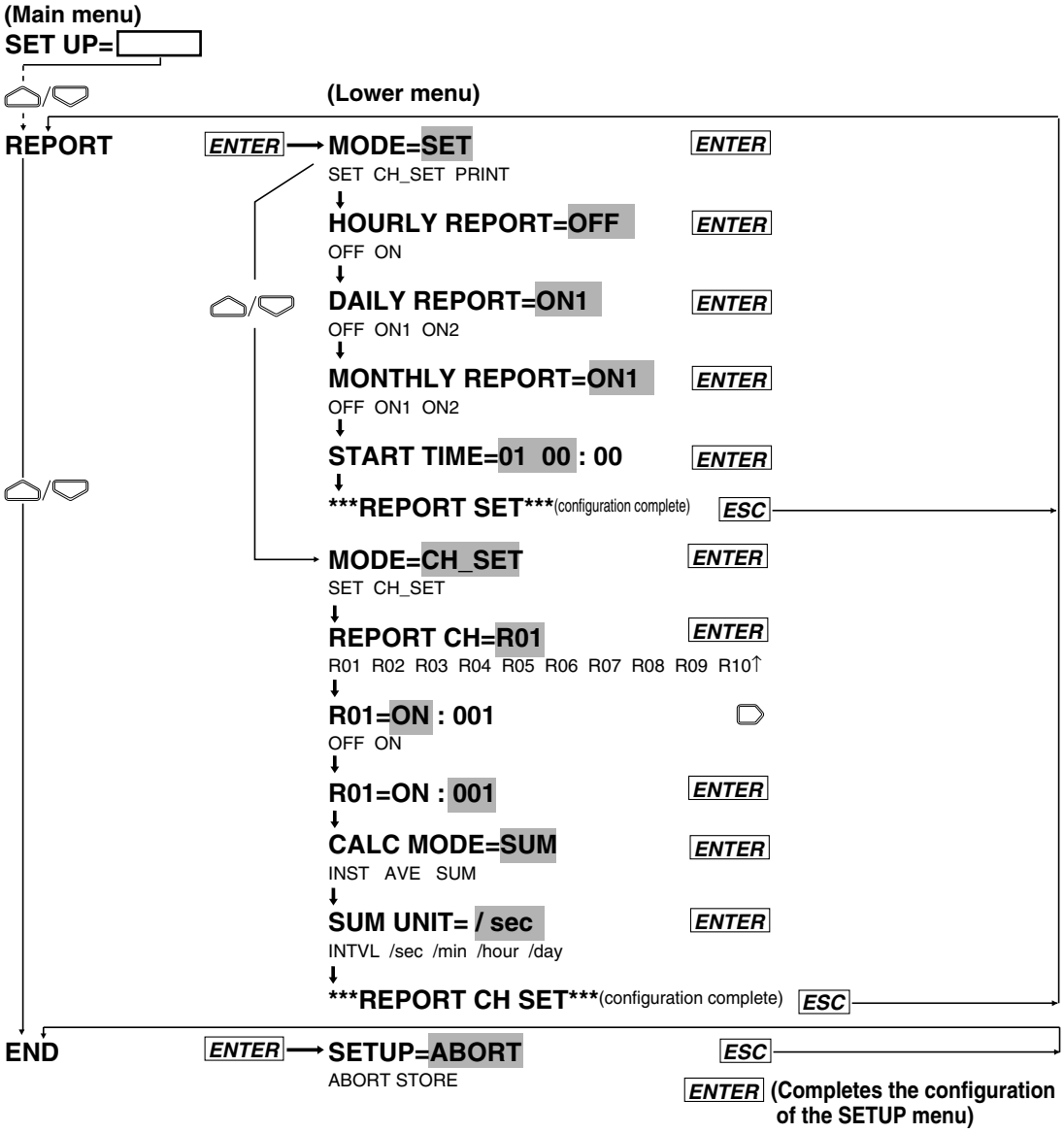
Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the △▽ keys.
- To exit any of the following menu items during the procedure, press the MODE (ESC) key. This returns to the first item of the menu. Note however that your new settings and selections are canceled.
- Reaching the step showing the message "***REPORT SET***" or "***REPORT CH SET***" confirms the latest settings/selections.

Sending the Instantaneous Value and Average to a Report Output



Sending the Sum to a Report Output



Explanation

The instrument calculates and processes an hour's, day's or month's worth of measurement or computation data into instantaneous values, averages and/or sums to creates files on the built-in RAM. For more information on the communication function, see the separate DC100 Communication Interface User's Manual (IM DC100-11E).
You select from the choices in the FUNC menu, which opens when you press the FUNC key, to start/stop report making. You can also start/stop report making using the event/action functions. Reports come in the following three types.

Type	Intervals Between Making Reports	Data Item for Computing
Hourly report	Every hour (1:00, 2:00 . . ., 23:00, 24:00)	An hour's average, maximum and minimum An hour's sum and cumulative sum Instantaneous value at the time of making the report
Daily report	Every other day (preset time)	A day's average, maximum and minimum A day's sum and cumulative sum Instantaneous value at the time of making the report
Monthly report	Every other month (preset time)	A month's average, maximum and minimum A month's sum and cumulative sum Instantaneous value at the time of making the report

Note

Both report and file writing must be started to create report files. Report can be started at the screen that appears when the "FUNC" key is pressed or by using the event/action function. File can be started by pressing the "START" key or by using the event/action function.

On/Off of Hourly, Daily and Monthly Report Making

Configure the on's and off's of hourly, daily and monthly report making, separately. You can set hourly, daily and monthly report making all to "on" at the same time. In addition, you can set daily and monthly reports to either the standard format (ON1) or the enhanced format (ON2) of output. Note that the enhanced format can only be set for either daily reports or monthly reports.

File Formats

The format of the report file is available in either the standard or enhanced format. Hourly reports can have the standard format only.

Standard format: Outputs the results of computing configured on a report-channel basis.
Enhanced format:
Daily reports: the results of computing configured on a report-channel basis plus hourly information on the result of computing given at each preset time.
Monthly reports: the results of computing configured on a report-channel basis plus daily information on given simultaneously with the preset time for making each report

Time to Make Report (START TIME)

Set the time to make a report in the format day of month : time. Define the day of month field within a 01-28 range and the time field within a 00-23 range.
Hourly reports:
The instrument makes reports every hour on the hour (1:00, 2:00, . . ., 23:00, 24:00). For cumulative summation, it resets the cumulative sum at a preset time.
Daily reports:
The instrument makes reports at a preset time or times. For cumulative summation, it resets the cumulative sum at the preset time of a day.
Monthly reports:
The instrument makes reports at a preset time of the day.

Report Channels

There are sixty report channels, from R01 to R60. You can assign channels for measuring objects being computed or computation channels and the type of computing on a report-channel basis. When making a report of computed data, let computing start before letting the report making start.

Types of Computing

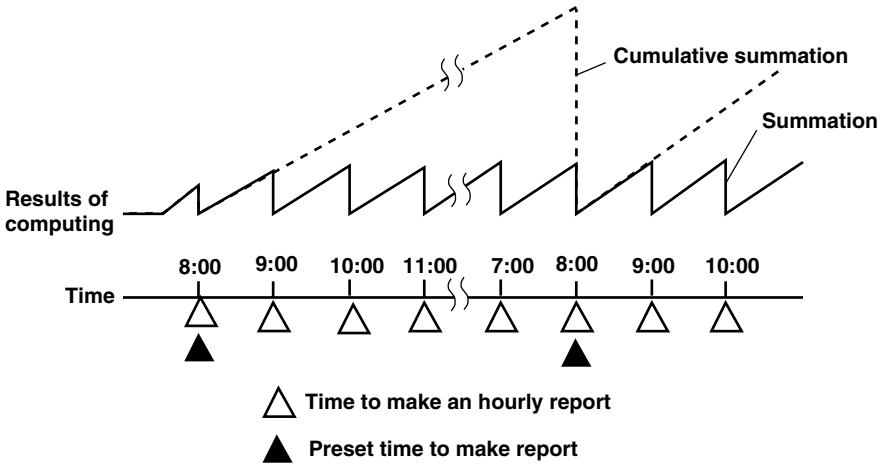
Menu Item	Data Item for Computing
INST	Instantaneous value at the time of making report
AVE	Average, maximum and minimum over the computing period
SUM	Sum and cumulative sum over the computing period

Sum and Cumulative Sum

Sum: The total sum over an hour for hourly reports, the sum over a day for daily reports or the sum over a month for monthly reports. The instrument resets this value each time it makes any of these reports.

Cumulative sum: The total sum up to the preset time to make a report in the case of hourly reports or the sum up to a preset time of the day to make a report in the case of daily reports. The instrument resets this value at each preset time or at each preset time of the day for report making. The instrument does not perform cumulative summation for monthly reports.

As an example, the following illustrates the process of summation and cumulative summation for hourly reports. The example shows the case where the preset time to make a report is 8:00.



Unit of Summation (SUM UNIT)

Such input data items as the flowrate that have a unit in /sec, /min, /hour or /day, when simply summed, give results of computing different from their actual values. This occurs because the unit of such a data item differs from that of the measurement interval. In that case, you can take the output after having converted the unit of summation so it matches that of the input data item applied.

Unit of Input (Preset Unit)	Conversion Formula
INTVL (no conversion)	$\sum$ (measured data values)
/sec	$\sum$ (measured data values) × measurement interval
/min	$\sum$ (measured data values) × measurement interval/60
/hour	$\sum$ (measured data values) × measurement interval/3600
/day	$\sum$ (measured data values) × measurement interval/86400

Starting/Stopping Report Making

Report making can be started or stopped in two ways:

- Press the FUNC key and select REPORT_START or REPORT_STOP from the FUNC menu.
- Use the event/action functions to define the start/stop of making a report for the following events:

  Edge action: You can define every event as an edge action to start/stop report making.

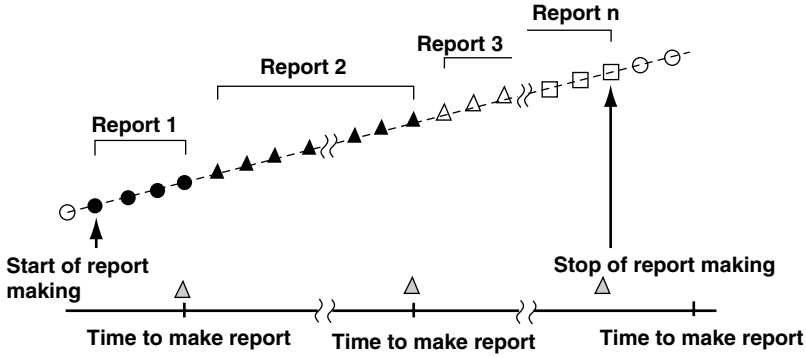
  Level action: You can use remote, alarm and relay as events to start/stop report making. Report making starts at the same time that any of these events occur. Report making stops when the event clears.

Note

- If you start report making, all reports created up to that point are reset.
- When report making is in progress, you cannot make changes to measurement channels, measuring ranges or dates and times nor can you copy information on the ranges.
- If any computed data are included in your report making, let computing start first and then get report making started. If you fail to enable computing, the data in your reports will become meaningless because no change takes place on the computed data.
- If you want the start of computing and report making enabled at the same time, use the event/action functions to assign both of these instructions to the same event as actions.

Time Relationship Between the Settings of the REPORT_START/STOP Menu Items and Report Making

The following figure shows the time relationship between the settings of the REPORT_START/STOP menu items and report making.



△ denotes the point in time a report is created.

- Data items included in the first round of report making after the start of report making are fewer in number than those included in the second and subsequent rounds of report making.
- The instrument samples data before stopping report making. The report created when the instrument stops making reports thus includes those data.
- If the time when report making is started coincides with the time the report is created, the start of report making precedes. Thus, no report is created.
- The data sampled at the same time report making started are included in first round of report making. The report created when the instrument stops making reports thus includes those data.
- If you have defined timer and match-time signals as events using the event/action functions so the time report making starts matches the time the report is created, data items included in the first round of report making are one data item greater in number than those included in the second or any subsequent round of report making.

Processing Against Absence of Measurement

Measurement may not take place if the instrument is loaded beyond its processing capability. If absence of measurement occurs, the instrument compensates for the missing data with the data it measures immediately after recovering from the absence of measurement (the data for the period with no measurement thus match those acquired immediately after recovering from the absence of measurement).

If Power Failure Occurs While Report Function Is Active

The instrument takes different actions depending on the length of a power failure.
If the power failure time is longer than 12 hours:

The instrument makes a report immediately after it recovers from the power failure and then stops making reports.

Results of computing: The instrument computes data measured up to the point immediately before the power failure.

Time of report making: The time when the power failure occurred.

If the power failure time is less than 12 hours:

The instrument takes different actions depending on the time it recovers from the power failure.

Time of Recovery from Power Failure	After the Time of Report Making	Before the Time of Report Making
Condition after recovery from power failure	Valid report function (start of report making enabled)	Valid report function (start of report making enabled)
Report making	Immediately after recovery from power failure	Time for report making
Data included in report making	Data measured up to the point of power failure	Data measured over the given period except the power failure time

If the power failure time covers the given period of report making, no report for that period is made.

Handling of Faulty Data

If data being computed contain any faulty data, the instrument treats the data as summarized in the following table, depending on the type of computing and faulty data.

Type of Faulty Data	Average	Minimum/Maximum	Instantaneous Value	Sum
Positive overflow	Excluded from computing	Included in computing	Takes faulty data as the result of computing	Excluded from computing
Negative overflow	Excluded from computing	Included in computing	Takes faulty data as the result of computing	Excluded from computing
Channels included in measurement set to SKIP	Excluded from computing	Excluded from computing	Takes faulty data as the result of computing	Excluded from computing
No channel included in measurement	Excluded from computing	Excluded from computing	Takes faulty data as the result of computing	Excluded from computing
Error	Excluded from computing	Excluded from computing	Takes faulty data as the result of computing	Excluded from computing
Output of data disabled	Excluded from computing	Excluded from computing	Takes faulty data as the result of computing	Excluded from computing

Notes on daylight savings time

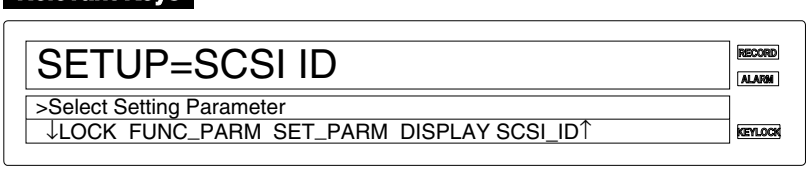
When the function to shift the time scale between standard time and daylight savings time is specified, the report for the day to shift from standard time to the daylight savings time seemingly includes data for only a 23-hour day and, at the same time, the report for the day to shift daylight savings time to standard time seemingly includes the data for a 25 hour day.
If you specify the time to make a report at the same time as the shift from standard time to daylight savings time, or vice versa, the report will be generated based on the time scale after the shift.
Display During Report Start **H** is displayed on the sub-display (lowest section on the display) while the report is started.

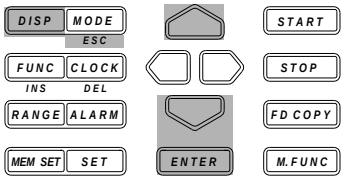
Note

If SETUP mode is entered while the report is started, a report file is created immediately after entering the SETUP mode and the report is stopped. In this case, the file is not copied even if the FILE END of the event/action function is set.

10.13 Changes the SCSI ID number of the DC100

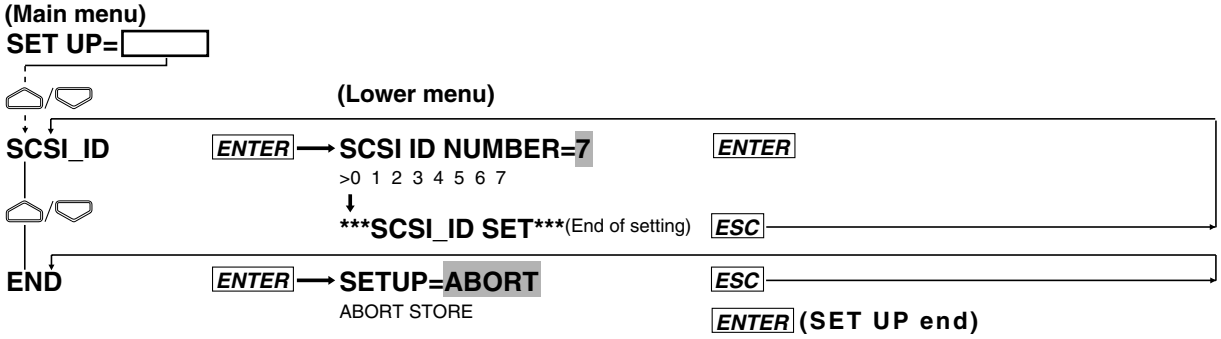
Relevant Keys





Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the △▽ keys.
- If exiting the following lower menu setting halfway, press the MODE (ESC) key. The display returns to the main menu to which the lower menu belongs. However, newly set or selected contents are canceled.
- When setting proceeds to the display for the setting end, the newly set or selected contents are established.



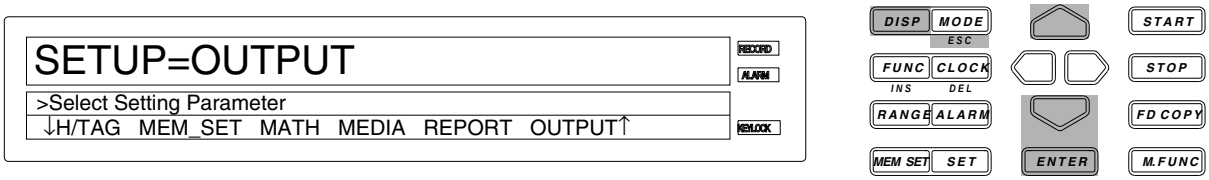
Explanation

SCSI ID number

Changes the SCSI ID number of the DC100. Set the ID so that it does not overlap with other SCSI devices connected to the DC100. The default value is 7.

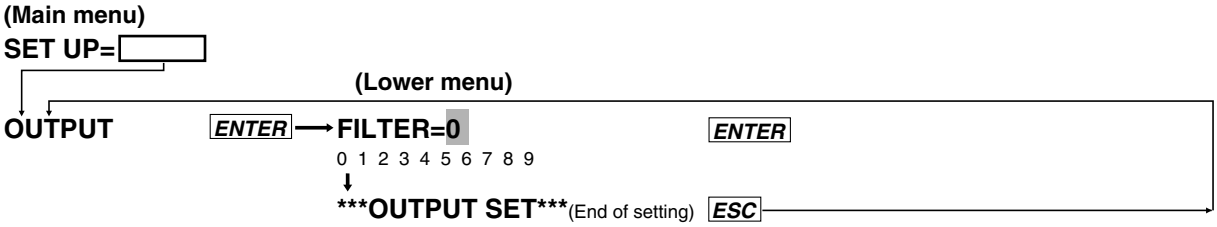
10.14 Setting the retransmission filter

Relevant Keys



Operating Procedure

- Enter the SET UP menu according to the following procedure:
  1. If a menu other than the operation display mode or SET UP menu is being displayed, turn OFF the power switch.
  2. Turn ON the power switch while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear. However, the new settings/selections are canceled.
- New settings/selections will be kept when you reach the final display of that setting.



Explanation

When the voltage or current output from the retransmission module changes drastically, set a time constant. Select the value in the range from 0 to 9. The relationship between the specified value and the time constant is as follows.

Value	Time Constant (ms)	Value	Time Constant (ms)
0	4	5	250
1	12	6	500
2	28	7	950
3	60	8	1750
4	125	9	3000

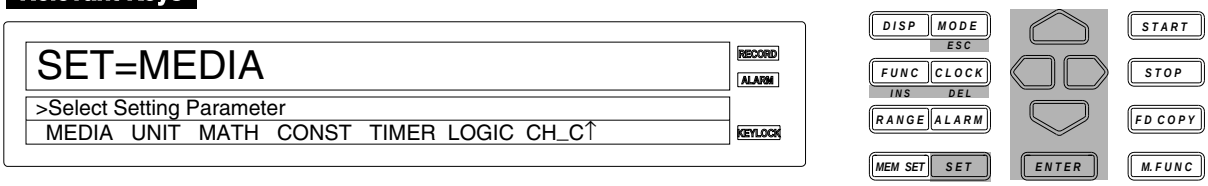
Note

The time constant is the value that is applicable when the voltage or current changes from 1 V to 5 V or from 4 mA to 20 mA, respectively. If the amount of change is small, the time constant may be smaller than the value specified.

11.1 Saving Set-up Data

Saving set-up data for the SET mode

Relevant Keys



Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET=

MEDIA

(Lower menu)

ENTER → **MEDIA=FLOPPY***1 ENTER

FLOPPY SCSI☐ IDENTIFY

↓

FLOPPY=SAVE ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

SAVE file= ENTER

____ AAA BBB CCC

↓

SAVE FILE=AAA ENTER

↓

Saving... *

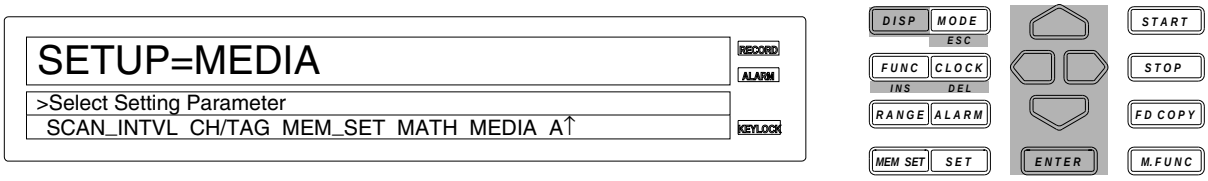
↓

*****SAVE OK*****(End of saving) ESC

*1 Displayed when the SCSI option (/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Saving set-up data for the SETUP mode

Relevant Keys



Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.

(Main menu)

SET UP=▭

△/▽

(Lower menu)

MEDIA — ENTER → **MEDIA=FLOPPY*1** — ENTER

FLOPPY SCSI□ IDENTIFY

↓

FLOPPY=SAVE — ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

SAVE file=▭ — ENTER

____ AAA BBB CCC

↓

SAVE FILE=AAA — ENTER

↓

Saving... *

↓

*****SAVE OK*****(End of saving) — ESC → (back to SET UP=▭)

*1 Displayed when the SCSI option (/C5) is installed.
SCSI□ is the SCSI ID number that is connected.

Explanation

Set-up data for the SET mode or SETUP mode, except for date/time, is saved to a floppy disk, MO, ZIP or PD. Data is always saved in ASCII format.
The file name must consist of up to 8 characters. The following identifier is used.
Set-up data file for SET mode : .PNL
Set-up data file for SETUP mode : .SET

Data capacity

- For the stand-alone model
  - Set-up data for the SET mode: Approx. 20 KB (max.) (for 40 measurement channels and 30 computation channels)
  - Set-up data for SETUP mode: Approx. 5 KB (max.) (for 40 measurement channels and 30 computation channels)
- For the expandable model
  - Set-up data for the SET mode: Approx. 80 KB (max.) (for 300 measurement channels and 60 computation channels)
  - Set-up data for SETUP mode: Approx. 20 KB (max.) (for 300 measurement channels and 60 computation channels)

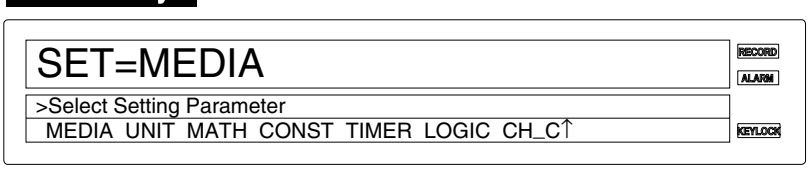
Note

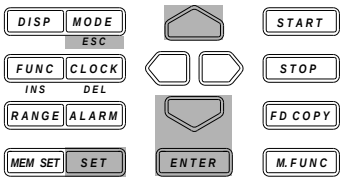
- "Saving ...*" will be displayed during saving. During this period, key board operations are not possible.
- No saving is allowed during computing.
- The communication function remains suspended during saving.

11.2 Reading Set-up Data

Reading set-up data for the SET mode

Relevant Keys





Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set using the ◠ ◡ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET= ☐

◠/◡

↓

MEDIA

(Lower menu)

ENTER → **MEDIA=FLOPPY*1** *ENTER*

FLOPPY SCSI☐ IDENTIFY

↓

FLOPPY=LOAD *ENTER*

SAVE LOAD DIR DELETE INFO FORMAT

↓

LOAD MODE=DIRECT *ENTER*

DIRECT TRIG_1 TRG_2 TRG_3

↓

LOAD FILE=AAA *ENTER*

AAA BBB CCC

↓

Loading... *

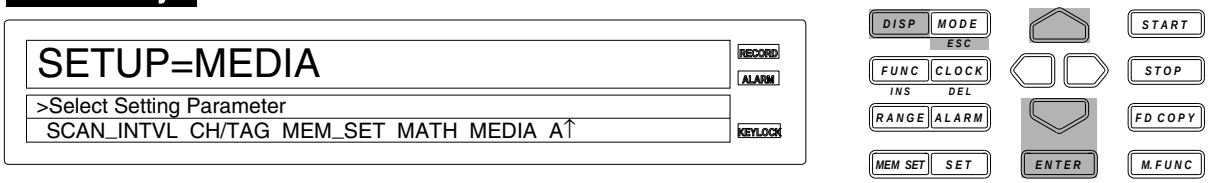
↓

Operation status displayed

*1 Displayed when the SCSI option (/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Reading set-up data for the SETUP mode

Relevant Keys



Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set using the ◠ ◡ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.

(Main menu)

SET UP=

◠/◡

↓

MEDIA — ENTER → **(Lower menu)**

MEDIA=FLOPPY*1 — ENTER

FLOPPY SCSI□ IDENTIFY

↓

FLOPPY=LOAD — ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

LOAD FILE=AAA — ENTER

AAA BBB CCC

↓

Loading...*

↓

Main menu

STORE for confirmation

*1 Displayed when the SCSI option (/C5) is installed.
SCSI□ is the SCSI ID number that is connected.

Explanation

Set-up data for the SET mode or SETUP mode is read from a floppy disk, MO, ZIP or PD.

Loading methods (LOAD MODE in SET mode)

The following two methods are available.

- DIRECT
  Set-up data is loaded immediately after setting has been completed.
- TRIG 1/TRIG 2/TRIG 3
  The event/action function is used to load set-up data when an event takes place. This function is useful if you want to save measured data when an event takes place, with different spans. One event must be set for the LD_TRIG1, LD_TRIG2 and LD_TRIG3 actions during event/action function setting. For a detailed description of the event/action function, refer to 9.1, "Setting Event/Action Functions" (page 9-1).

Confirming the set-up data

To confirm the read set-up data for the SETUP mode, specify SETUP = STORE in the same way as the SETUP mode setting.

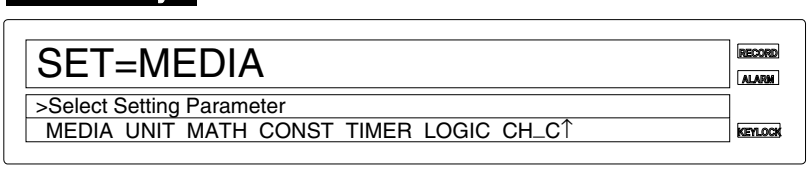
Note

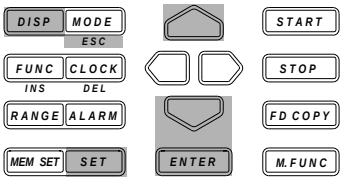
- Setting data saved by a stand-alone model cannot be read by an expandable model nor can setting data saved by an expandable model be read by a stand-alone model. The setting data in the other instrument, even if it is the same model, cannot be read and set because the setting values become inconsistent if the instrument configuration is different.
- No reading is allowed during computing.
- The communication function remains disabled during reading.

11.3 Displaying the Directory of a Floppy Disk

Displaying a directory in the SET mode

Relevant Keys





Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set using the ⌃⌄ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET= ☐

⌃/⌄

(Lower menu)

MEDIA — ENTER → **MEDIA=FLOPPY***1 — ENTER

FLOPPY SCSI☐ IDENTIFY

↓

FLOPPY=DIR — ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

FREE 20000BYTES — ENTER

>FILE001. DAT 97/06/01 06:30

>FILE002. DAT 97/06/02 10:00

↓

*****DIR END*****(End of setting) — ESC → (back to menu)

*1 Displayed when the SCSI option(/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Displaying a directory in the SETUP mode

The directory of a floppy disk, MO, ZIP or PD can be displayed in the same way as in the SET mode.
Select MEDIA from the SETUP menu.

(Main menu)

SET UP= ☐

⌃/⌄

(Lower menu)

MEDIA — ENTER → **MEDIA=FLOPPY***1 — ENTER

FLOPPY SCSI☐ IDENTIFY

↓

FLOPPY=DIR — ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

FREE 20000BYTES — ENTER

>FILE001. DAT 97/06/01 06:30

>FILE002. DAT 97/06/02 10:00

↓

*****DIR END*****(End of setting) — ESC → (back to menu)

*1 Displayed when the SCSI option(/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Explanation

The floppy disk, MO, ZIP or PD directory and the free space available on the built-in RAM disk are displayed.

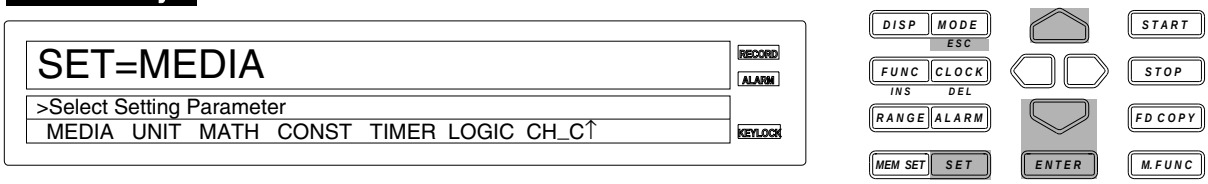
Directory

- The file name and file creation date are displayed.
- File names are displayed by switching using the ⌃ or ⌄ key.

11.4 Deleting a Data File on a Floppy Disk

Deleting a data file in the SET mode

Relevant Keys



Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set using the ⏶⏷ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET= ☐

⏶/⏷

(Lower menu)

MEDIA — ENTER → **MEDIA=FLOPPY***1 — ENTER

FLOPPY SCSI☐ IDENTIFY

↓

FLOPPY=DELETE — ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

DELETE TYPE=DAT — ENTER

DAT DAS PNL SET CSV RBI

↓

DELETE FILE=AAA — ENTER

AAA BBB CCC

↓

DELETE=YES — ENTER

NO YES

↓

*****DELETE OK*****(End of setting) — ESC

*1 Displayed when the SCSI option(/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Deleting a data file in the SETUP mode

A data file can be deleted in the same way as in the SET mode.
Select MEDIA from the SETUP menu.

(Main menu)

SET UP= ☐

⏶/⏷

(Lower menu)

MEDIA — ENTER → **MEDIA=FLOPPY***1 — ENTER

FLOPPY SCSI☐ IDENTIFY

↓

FLOPPY=DELETE — ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

DELETE TYPE=DAT — ENTER

DAT DAS PNL SET CSV RBI

↓

DELETE FILE=AAA — ENTER

AAA BBB CCC

↓

DELETE=YES — ENTER

NO YES

↓

*****DELETE OK*****(End of setting) — ESC

*1 Displayed when the SCSI option(/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Explanation

A file saved on a floppy disk, MO, ZIP or PD is deleted.

Type of File to Be Deleted

DAT: Deletes the measured/computed data.
DAS: Deletes the periodic file.
RBI: Deletes the report data.
PNL: Deletes the setting data in the SET mode.
SET: Deletes the setting data in the SETUP mode.
CSV: Deletes the measured data converted to ASCII format.

Acknowledging File Deletion

YES: Deletes the file.
NO: Does not delete the file.

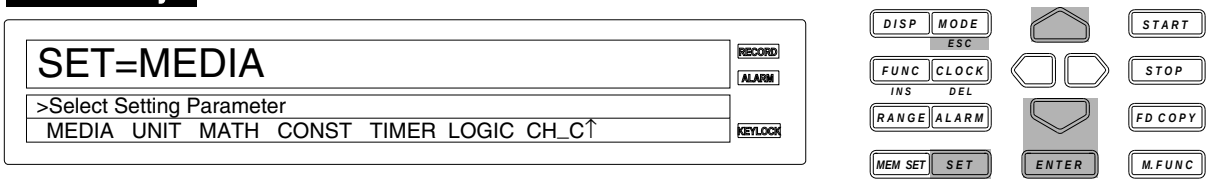
Note

The communication function is disabled during deletion.

11.5 Displaying Floppy Disk Information

Displaying information in the SET mode

Relevant Keys



Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET= ▭

△/▽

(Lower menu)

MEDIA — ENTER → **MEDIA=FLOPPY*1** — ENTER

FLOPPY SCSI☐ IDENTIFY

↓

FLOPPY=INFO — ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

>VOLUME=DARWIN — ENTER

>MEMORY= 20000 BYTES

*****INFO END*****(End) — ESC → (back to MEDIA)

*1 Displayed when the SCSI option (/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Displaying information in the SETUP mode

Information can be displayed in the same way as in the SET mode.
Select MEDIA from the SETUP menu.

(Main menu)

SET UP= ▭

△/▽

(Lower menu)

MEDIA — ENTER → **MEDIA=FLOPPY*1** — ENTER

FLOPPY SCSI☐ IDENTIFY

↓

FLOPPY=INFO — ENTER

SAVE LOAD DIR DELETE INFO FORMAT

↓

>VOLUME=DARWIN — ENTER

>MEMORY= 20000 BYTES

*****INFO END*****(End) — ESC → (back to MEDIA)

*1 Displayed when the SCSI option (/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Explanation

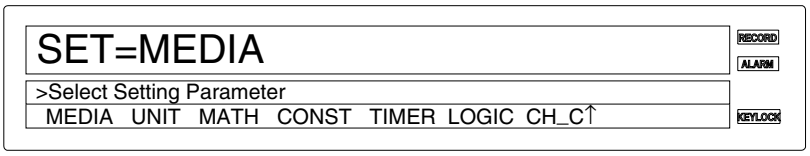
Floppy disk, MO, ZIP or PD information is displayed.

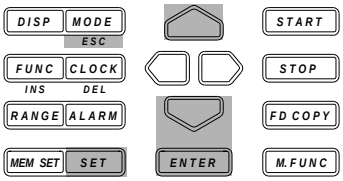
Floppy disk

Volume name and memory utilization are displayed.

11.6 Formatting a Disk

Relevant Keys

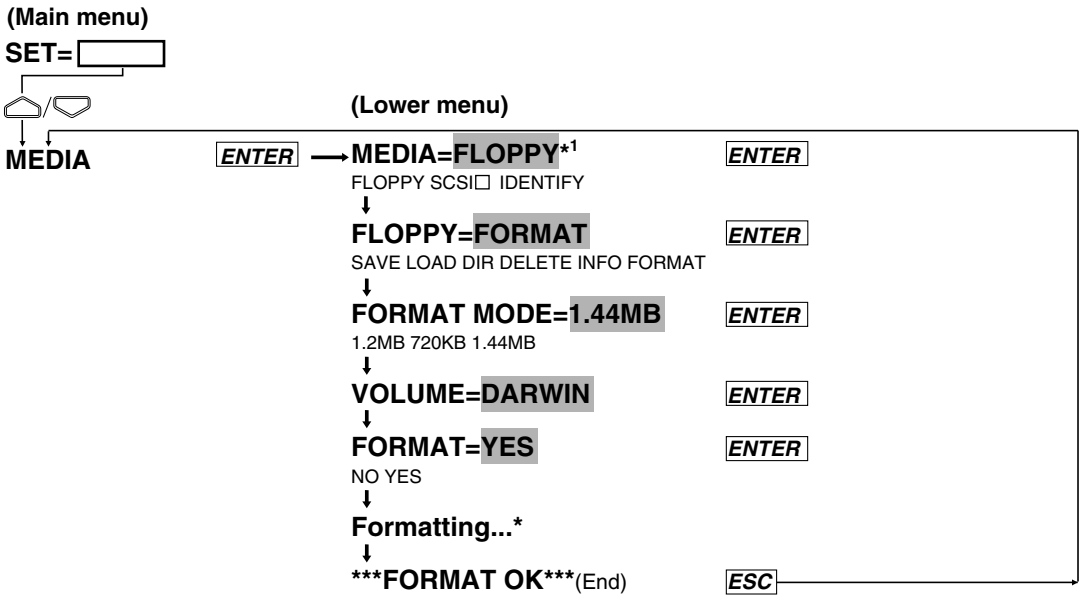




Operating Procedure

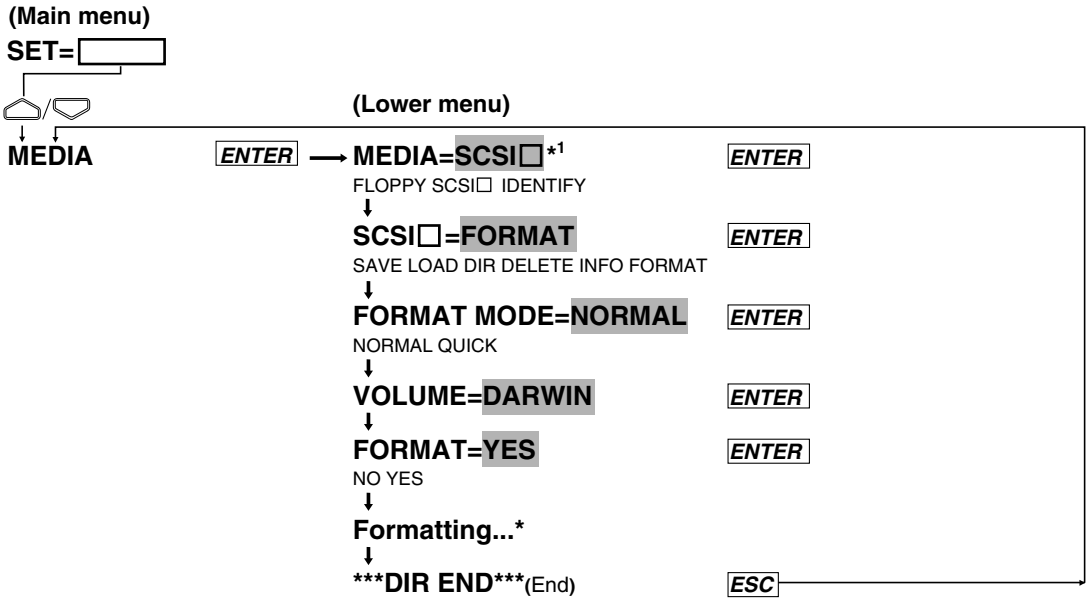
- Press the SET key to enter the SET menu.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

Formating a floppy disk in the SET mode



*1 Displayed when the SCSI option(/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Formating a SCSI device in SET mode



*1 Displayed when the SCSI option(/C5) is installed.
SCSI☐ is the SCSI ID number that is connected.

Formatting a floppy disk, MO, ZIP or PD in the SETUP mode

A floppy disk, MO, ZIP or PD can be formatted in the same way as in the SET mode.
Select MEDIA from the SETUP menu.
The rest of the procedure is the same as in the SET menu.

Explanation

A floppy disk, MO, ZIP or PD is formatted. All the data on the floppy disk will be deleted. Thus, copy necessary data to another media before carrying out formatting.

Format mode (FORMAT MODE)

Select the format mode from the following.
2HD: 1.44 MB, 1.2 MB
2DD: 720 KB

Disk Format

The format of the MO disk, ZIP or PD connected to the SCSI (option) is semi-IBM format.

Disk Format Mode

NORMAL: Performs both physical format and logical format.
QUICK: Performs logical format only.
The time needed to format the disks are as follows.

Media	NORMAL	QUICK
MO (128 MB)	About 15 min	About 5 s
MO (230 MB)	About 15 min	About 5 s
ZIP	About 10 min	About 5 s
PD	About 30 min	About 5 s

Use MO/ZIP/PD disks that are formatted on the DC100.

Volume name

Beginning the volume name with a space is not allowed. If this happens, an error will occur.

Note

The communication function is disabled during formatting.

Precautions to be taken during formatting

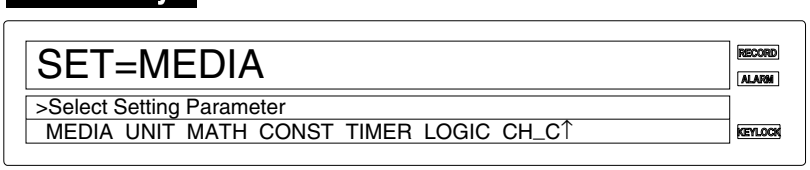
- If a floppy disk that contains data is formatted, all the data on the disk will be lost.
- Formatting for a floppy disk takes approx. one-and-half minutes.
- Before starting formatting, make sure that the write protection tab on the floppy disk is released.

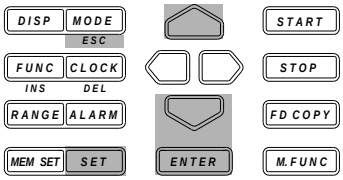
Note

- Logical (Quick) format only clears (initializes) the directory entries and the FAT. If you wish to check for bad sectors, do a physical (Normal) format also.
- If writing data to an external SCSI device having bad sectors no more data can be written to the device. As a guideline, do a Normal format on disks used for the first time or disks which can no longer be read or written, and a Quick format on disks which have been used previously.

11.7 Detecting MO/ZIP/PD Disk Drive

Relevant Keys





Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET=

MEDIA

(Lower menu)

ENTER → **MEDIA=IDENTIFY** *1 → ENTER

FLOPPY SCSI□ IDENTIFY

↓

*****Identifying...*****

↓

*****IDENTIFY OK*****

*1 Displayed when the SCSI option (/C5) is installed.
SCSI□ is the SCSI ID number that is connected.

MO/ZIP/PD disk drives can also be detected using "Media" under the SET UP mode.

Explanation

Detects the MO/ZIP/PD disk drive.

MO/ZIP/PD disk drives that are turned on while the DC100 is in use, are not detected by the DC100. In this case, perform this manual detection.

12.1 Overview of the Computation Function

Computations using the measured data in each input channel can be executed and the results can be displayed/saved. The computations can be executed using the following operators.

Type	Operator	Example	Description
Addition	+	001+002	Obtain the sum of the measured data of channel 001 and channel 002.
Subtraction	-	002-001	Obtain the difference of the measured data of channel 002 and channel 001.
Multiplication	*	003*K1	Multiply constant K1 to the measured data of channel 003.
Division	/	004/K2	Divide the measured data of channel 004 by constant K2.
Power	**	005**006	Take the power of measured data of channel 005 with the measured data of channel 006.
Absolute value	ABS()	ABS(001)	Obtain the absolute value of the measured data of channel 001.
Square root	SQR()	SQR(002)	Obtain the square root of the measured data of channel 002.
Common logarithm	LOG()	LOG(003)	Obtain the common logarithm of the measured data of channel 003.
Natural Logarithm	LN()	LN(004)	Obtain the natural logarithm of the measured data of channel 004.
Exponent	EXP()	EXP(005)	Make the measured data of channel 005 to be x and obtain e^x.

* +/- can be used as signs as in -(001).

Logical operators

Type	Operator	Example	Description
Logical product	AND	001AND002	when channel 001=0 and channel 002=0, “0”. when channel 001=nonzero and channel 002=0, “0”. when channel 001=0 and channel 002=nonzero, “0”. when both channel 001 and channel 002 are nonzero, “1”.
Logical sum	OR	001OR002	when channel 001=0 and channel 002=0, “0”. when channel 001=nonzero and channel 002=0, “1”. when channel 001=0 and channel 002=nonzero, “1”. when both channel 001 and channel 002 are nonzero, “1”.
Exclusive OR	XOR	001XOR002	when channel 001=0 and channel 002=0, “0”. when channel 001=nonzero and channel 002=0, “1”. when channel 001=0 and channel 002=nonzero, “1”. when both channel 001 and channel 002 are nonzero, “0”.
Logical negation	NOT	NOT001	when channel 001=0, “1”. when channel 001=nonzero, “0”.

Relational operators

Type	Operator	Example	Description
Equal	.EQ.	001.EQ.002	when channel 001 = channel 002, “1”. when channel 001 ≠ channel 002, “0”.
Not equal	.NE.	002.NE.001	when channel 001 ≠ channel 002, “1”. when channel 001 = channel 002, “0”.
Greater than	.GT.	003.GT.K1	when channel 003 > constant K1, “1”. when channel 003 ≤ constant K1, “0”.
Less than	.LT.	004.LT.K10	when channel 004 < constant K10, “1”. when channel 004 ≥ constant K10, “0”.
Greater than or equal to	.GE.	003.GE.K1	when channel 003 ≥ constant K1, “1”. when channel 003 < constant K1, “0”.
Less than or equal to	.LE.	004.LE.K10	when channel 004 ≤ constant K10, “1”. when channel 004 > constant K10, “0”.

Specified channel statistical operators

Type	Operator	Example	Description
Maximum value	TLOG.MAX()	TLOG.MAX(001)	Obtain the maximum value of the measured data of channel 001.
Minimum value	TLOG.MIN()	TLOG.MIN(002)	Obtain the minimum value of the measured data of channel 002.
Max-min value	TLOG.P-P()	TLOG.P-P(003)	Obtain the P-P value of the measured data of channel 003.
Total value	TLOG.SUM()	TLOG.SUM(004)	Obtain the total value of the measured data of channel 004.
Average value	TLOG.AVE()	TLOG.AVE(005)	Obtain the average value of the measured data of channel 005.

* Statistical computation of the measured data from the start of the statistical computation until it is stopped. When combining with each of the operators, MAX(), MIN(), P-P(), SUM(), and AVE(), the value that can be specified in () is limited to the input channel number or the computation channel number (refer to next page) (Example: TLOG.MAX(A01)).

Statistical operators within the group

Type	Operator	Example	Description
Maximum value	CLOG.MAX()	CLOG.MAX(G01)	Obtain the maximum value of the measured data of group G01.
Minimum value	CLOG.MIN()	CLOG.MIN(G02)	Obtain the minimum value of the measured data of group G02.
Max-min value	CLOG.P-P()	CLOG.P-P(G03)	Obtain the P-P value of the measured data of group G03.
Total value	CLOG.SUM()	CLOG.SUM(G04)	Obtain the total value of the measured data of group G04.
Average value	CLOG.AVE()	CLOG.AVE(G05)	Obtain the average value of the measured data of group G05.

* Statistical computation of the measured data of the input channel within the same group measured at the same time every specified interval. When combining with each of the operators, MAX(), MIN(), P-P(), SUM(), and AVE(), the value that can be specified in () is limited to the group number.

Special operators

Type	Operator	Example	Description
Previous value*	PRE()	PRE(001)	Obtain the previous measured data of channel 001.
Hold**	HOLD():	HOLD(001):TLOG.SUM(002)	When the measured value of channel 001 changes from 0 to a nonzero value, maintain the displaying integrated value of the measured data of channel 002 while the measured value of channel 001 is nonzero.
Reset**	RESET():	RESET(001):TLOG.SUM(002)	When the channel 001 = nonzero, reset the integrated value of the measured data of channel 002.

* Previously measured data or computed data. In the case of computed data, the value is set to 0 when the computation is reset. At the start of the computation, if the computation was reset, the value is "0". If it was not reset, the value is the last value of the previous computation. The value that can be specified in () is limited to the input channel number (001 to 040 for the stand-alone model, or 001 to 560 for the expadable model) or the computation channel number (A01 to A30 for the stand-alone model, or A01 to A60 for the expandable model). Each computing equation can be used once.

** When specifying HOLD(A):B or RESET(A):B, A and B are channel numbers or computing equations. These can be used once in the beginning of the computing equation.

Computation channel

Stand-alone model: A total of 30 computation channels are available (A01 to A30).
Expandable model: A total of 60 computation channels are available (A01 to A60).

Constant

Stand-alone model: A total of 30 constants can be set (K01 to K30).
Expandable model: A total of 60 constants can be set (K01 to K60).

Flag (F01 to F16)

Flags can be set in computing equations as constants (1 or 0). Flags are normally 0, but it is set to 1 when a certain event occurs according to the event/action function. For example, if the computing equation is set to

NOTF01*TLOG.SUM(001),

and FLAG:F01 is set as an edge action of an event/action, F01 becomes 1 when the event occurs. This causes NOTF01 to become 0 and the SUM of channel 001 to become 0.

Computation range

If the result exceeds $\pm 10^{308}$ during computation, an overflow will occur.

Data applicable for computation

The following data is used for computation.

- Measured data: Specified by channel No. (001 to 040 for the stand-alone model, or 001 to 560 for the expandable model).
- Computed data: Specified by computation channel No. (A01 to A30 for the stand-alone model, or A01 to A60 for the expandable model).
- Constant: Value specified for K01 to K30 for the stand-alone model, or K01 to K60 for the expandable model.
- Group data: Measured data of channels belonging to a group. Specified by group No. (G01 to G07). This is applicable only for CLOG.
- Communication input data: Data written to the instrument's memory via communication interface. Specified by data No. (C01 to C30 for the stand-alone model, or C01 to C60 for the expandable model).

Handling of data for computation

For computation, measured/computed data is treated as a value having no unit. For instance, if the measured data for channel 001 is 20 mV and the measured data for channel 002 is 20 V, the computation result of "001 + 002" will be 40.

Priority of Operators

Priority of operators when they are used in an equation is shown below. Operators are listed in order of priority, from the highest to the lowest.

Type	Operator
Function	ABS(), SQR(), LOG(), LN(), EXP(), MAX(), MIN(), P-P(), SUM(), AVE(), PRE(), HOLD():, RESET():
Power	**
Sign, logical negation	+, -, NOT
Multiplication, division	*, /
Addition, subtraction	+, -
Greater, smaller	.GT., .LT., .GE., .LE.
Equal, not equal	.EQ., .NE.
Logical AND	AND
Logical OR, exclusive OR	OR, XOR

Limitations in computing equations

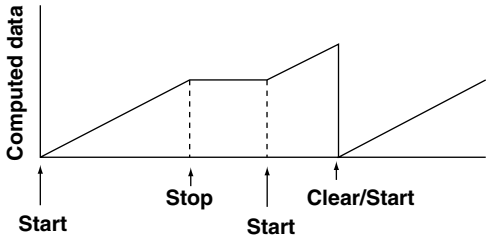
Multiple operators can be used in 1 computing equation. But, there are following limitations.

- Number of characters that can be used : 40 characters
- Total number of channel numbers and constants: 16 (Computation error occurs when 16 exceeded, and the computed result becomes +OVER or -OVER.)
- Computation channel numbers: Computation channel numbers less than the current computation channel number can be used as variables within the computing equation. Example: A02=001+A01 ← Computation channel numbers greater than or equal to A03 can not be used in this computation.
- Statistical operators (TLOG. or CLOG.) can only be used once in 1 computing equation.

Control of Computing Operation

There are two methods: control with the FUNC menu and control with the event/action function.

- Control with the FUNC menu
  Start/stop of computation and the computed results clear (simple clear or computation immediately after clearing is selected) can be carried out.



- Control with the event/action function
  Event generation can start/stop computation or clear/reset the computed results.

Alarm

Up to 4 alarms can be set for each computation channel. Only two types of alarm are available: upper-limit alarm (H) and lower-limit alarm (L). Hysteresis is always set to "0". For a detailed description of alarm setting, refer to 8.1, "Setting Alarms and Relays (including internal switches)" (page 8-1).

Event/action function

The event/action function can be used to start/stop computation and clear computation channels in case an event takes place. For a detailed description of the event/action function, refer to 9.1, "Setting Event/Action Functions" (page 9-1).

Actions to be taken in case of overflow and computation error

Actions to be taken in case of an error during computation can be specified.

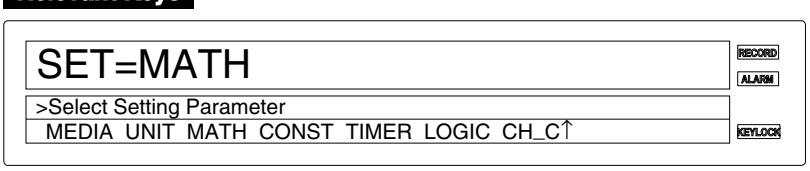
- Error display: +OVER or -OVER is displayed.
- Error data during TLOG or CLOG: The operator is asked to select whether to display the data as a computation error or ignore the error and continue computation.
- Overflow data during TLOG or CLOG: The operator is asked to select whether to display the data as a computation error or ignore the error and continue computation. The operator is also asked to select whether or not the data be used as the upper-/lower-limit value.
  Description of the upper-/lower-limit value is given below:
  Measurement channels to which linear scaling is applied: Specified scaling upper-/lower-limit
  Measurement channels to which no linear scaling is applied: Upper-/lower-limit of the measuring range
  Computation channels: Specified LEFT/RIGHT value

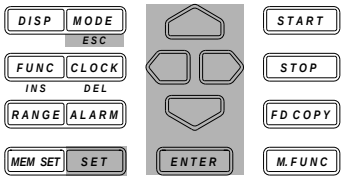
Group Reset

By using the event/action function, you can reset the computed values of computed channels registered in the group.

12.2 Setting a Computation Equation

Relevant Keys





Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET= ▭

(Lower menu)

MATH — ENTER → **A01-01:MODE=ON** ▷
>Select Channel No.
↓
A01-01:MODE=ON ▷
>Select Channel No.
↓
A01-60:MODE=ON ENTER
OFF ON
↓
CALC=001 + 002 ▷
0 1 2 3 4 5 6 7 8 9 ( ) C G M A .NE.
↓
CALC=001 + 002 ▷
0 1 2 3 4 5 6 7 8 9 ( ) C G M A .NE.
↓
CALC=001 + 002 ENTER
0 1 2 3 4 5 6 7 8 9 ( ) C G M A .NE.
↓
LEFT=-3000.000Kg ENTER
>Span limit (-9999.999 ~9999.999Kg)
↓
RIGHT= 3000.000Kg ENTER
>Span limit (-9999.999 ~9999.999Kg)
↓
*****SET OK*****(End of setting) ESC → (back to MATH)

Explanation

For the stand-alone model, a computation equation can be set for up to 30 channels (A01 to A30). For the expandable model, a computation equation can be set for up to 60 channels (A01 to A60).

Setting the mode

If "A01-60 MODE=ON" is specified as in the example given on the previous page, the same equation can be set for channels A01 to A60. To set an equation for one channel only, specify, for instance, "A01-A01 MODE=ON".

Computation equation

In addition to operators described on page 12-1, the following symbols can be used in equations.

(/) : Used for ( ) setting.
K : Used if equations contain constants K01 to K60 (or K01 to K30 for the stand-alone model).
A : Used to specify the computation channel No. as in "A05."
C : Used to specify communication input data (digital data).
G : Used to specify the group No. for which CLOG (computation of data of a group measured on the same time) is to be used.

Restrictions in equations

Computation channel No

- The specified computation equation for a computation channel No. can contain only computation channel Nos. as variables which are equal to or smaller than the said computation channel No.
  (Example) A02=001+A01
  In this example, any computation channel No. which is equal to or greater than A03 cannot be used.
- Either TLOG or CLOG can be used in an equation.

Note

- Each equation must consist of up to 40 characters.
- The total number of channels and constants to be used for each equation is 16 or smaller.

Setting the span

The upper and lower limits of the computed results are set. The computed results, if they overreach these limits, are handled as over data. The setting range is from -9999999 to 99999999. The decimal point can be placed in five positions, as represented in x.xxxx, xx.xxx, xxx.xx, xxxx.x, xxxxx.. The unit specified in 8.3, "Setting the Engineering Unit" (page 8-5) will be used.
LEFT : Sets the lower-limit value.
RIGHT: Sets the upper-limit value.

Note

If the computation ON/OFF, computation equation or span setting is changed, the alarm setting for the corresponding channel will be reset.

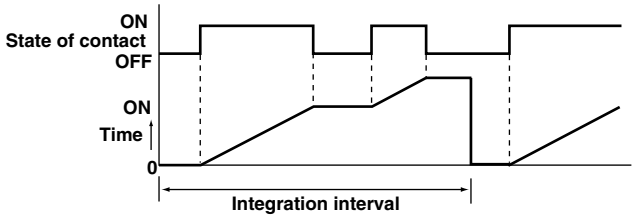
Example of Settings of CLOG

When computing the maximum, minimum, maximum minus minimum, sum and average of data measured at the same time on multiple channels, you must configure groups beforehand.
Example of settings where the averages for channels 001, 002, 003, 004, 006 and 008 are computed:

Configuration of groups:
In the SET menu, assign channels 001, 002, 003, 004, 006 and 008 to group G01, as shown below:
SET=GROUP
GROUPNo.=G01
G01=001-004, 006, 008
Define the computational expression that computes the average of group 1, as shown below:
CALC=CLOG.AVE (G01)

Computation on Pulse Input Channels

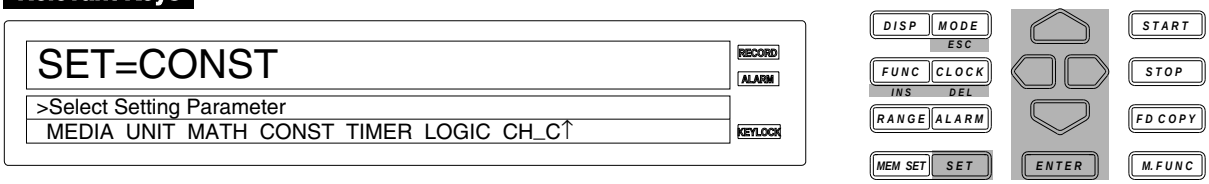
For pulse input channels, you can define the operator TLOG.PSUM (XXXX) evev if the instrument does not have the optional MATH function (/M1 option). The type of computation is the integration of the count if the measurement mode is set to RATE (instantaneous count mode) or the integration of the turn-on time if the measurement mode is set to GATE (instantaneous turn-on time mode). In either case, the integrated value is the sum of values measured every second. For this reason, even if you set the measurement interval to 0.5 second, the instrument retains the same value for one second.
Set the maximum count and turn-on time using SPAN. The maximum configurable value is 99999999. Set the interval of summation (integration interval) as a relative or absolute time by setting the event to TIMER with the event/action functions. Set the action to TIMER RESET. See Section 9.1, "Setting Event/Action Functions," (on page 9-1) for details on how to configure the event/action functions.
If the computational expression is written as TLOG.PSUM (XXX) in the system reconfiguration where the PULSE INPUT MODULE filed is set to "not installed," the computational expression and alarm settings are initialized. In addition, if the instrument is not a model with the optional MATH function (/M1 option), groups to which computation channels were assigned by the group setting and logic boxes to which actions of the MATH function were assigned by the logic setting are initialized.



You can select whether to treat a result of the computational expression TLOG.PSUM (XXXX) exceeding 99999999 as an overflow or to continue computing with the value following 99999999 reset to 0. For details on how to make the selection, see Section 12.5, "Setting Action to Be Carried Out in Case of Computation Error and Setting the Time Axis for TLOG SUM." The result of computing in this context is that resulting from a separate calculation of TLOG.PSUM (XXXX). If you set the computational expression as TLOG.PSUM (XXXX)*100, the above action does not take place even if the result of the calculation TLOG.PSUM (XXXX)*100 exceeds 99999999. If you have made such selection as to continue computing even if the result exceeds 99999999, the value subsequent to 99999999 is reset to 0. If the next measured value is 4 after the result of computing has proved to be 99999999, that value is not reset to 0 but is counted in sequence from 0 to 3, giving 3 as the result.

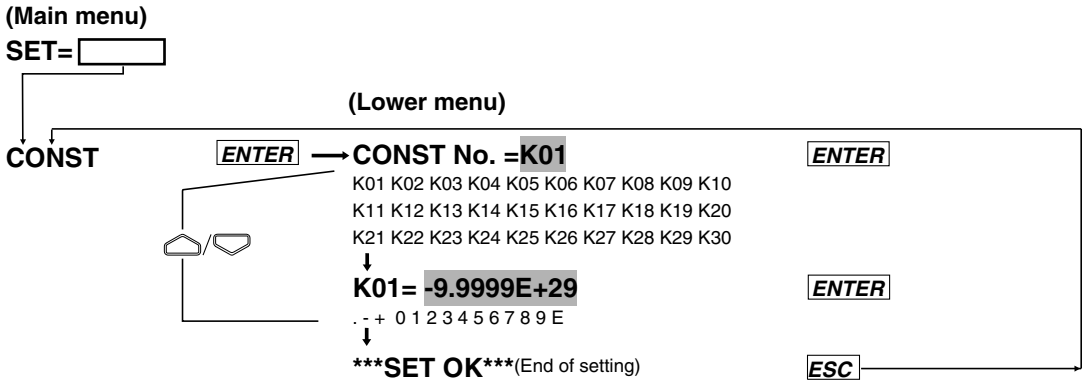
12.3 Setting a Constant

Relevant Keys



Operating Procedure

- Press the SET key to enter the SET menu.
- Select/set ▭ using the △▽ keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

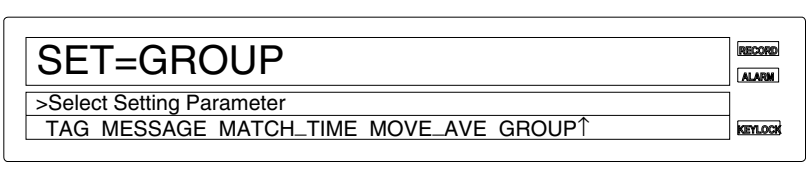


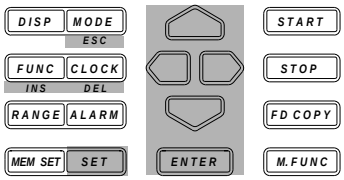
Explanation

Up to 60 constants (K01 to K60) can be set. (30 constants (K01 to K30) for the stand-alone type)
The number of significant digits is 5 excluding the decimal point. If exponent is used, the mantissa and exponent must consist of 5 digits and 2 digits, respectively.
Configurable ranges:
-1.0000E+35 to -1.0000E-35
0
1.0000E-35 to -1.0000E+35

12.4 Setting Groups

Relevant Keys





Operating Procedure

- Press the SET key for three seconds to enter the SET3 menu.
- Select/set ▭ using the ⌓ ⌔ keys.
- To escape from a lower menu, press the "MODE (ESC)" key. Its main menu will appear, although new settings/selections will not be kept.
- New settings/selections will be kept when you reach the final display of that setting.

(Main menu)

SET= ▭

(Lower menu)

GROUP *ENTER* → **GROUP No. = G01** *ENTER*

G01 G02 G03 G04 G05 G06 G07

↓

G01 = 001,010-020_____ *ENTER*

>=[_____]

, −_0123456789

↓

*****SET OK*****(End of setting) *ESC*

Explanation

Group setting (GROUP)

- GROUP No. (selection of the group number)
  Up to seven groups can be set.
- G01 to G07
  This setting specifies which channel numbers will be included in one group. A "," is used for entering a single channel, while a "-" can be used to enter a range of channels. Setting the same channel two or more times in one group causes an error. For example, if you configure G01 as 003, 001-010, an error will result because 003 is included in this range. The default setting is 001.
  When clearing the group using the action of the event/action function, select computing channels for the group.

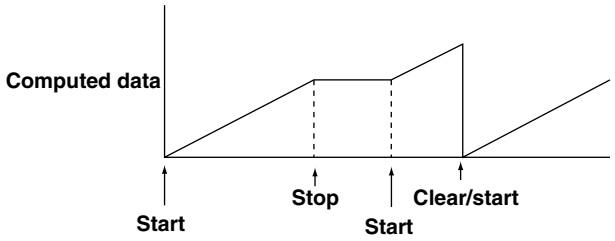
12.5 Starting/Stopping Computation

Computation can be started and stopped from the FUNC menu or using the event/action function.

Starting/stopping computation from the FUNC menu

Press the FUNC key and select the desired operation from the FUNC menu.

- MATH START
  Starts computation. This is displayed while computation is not in progress.
- MATH CLR START
  Clears computation results then re-starts computation.



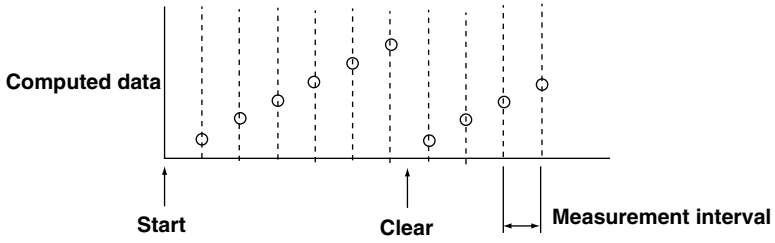
- MATH STOP
  Stops computation. Computation results are not cleared. This is displayed while computation is in progress.
- MACH ACK
  Clears status indication which is displayed in case of incomplete measurement during computation.

For a detailed description of the FUNC menu, refer to 9.3, “Alarm Acknowledgment, Alarm Reset, Timer Reset, and Keylock” (page 9-14).

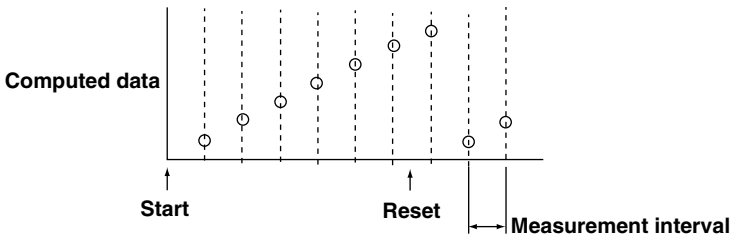
Starting/stopping computation using the event/action function

The event/action function can be used to carry out the following operations.

- MATH START
  Starts computation.
- MATH STOP
  Stops computation.
- MATH CLEAR
  Clears data before the first computation is carried out.



- MATH RESET
  Clears data after the first computation is carried out.



Event/action function

An example of setting the event/action function is given below.
Set the event/action function if you want to reset the results after computation is carried out for a certain period of time, then resume computation.

1. Set TIMER RST for the MFUNC KEY event.
2. Set MATH:START for the same MFUNC KEY event.
3. Set MATH:RESET for TIMER:1 event.
4. Set the mode for TIMER No.1 to RELATIVE and TIME to “00 01:00”.

After the above settings have been made, press the M.FUNC key. Timer 1 will be reset according to the above steps 1 and 2, then computation starts. After elapse of one hour, computation results will be reset according to step 3, but computation will still continue. When a further hour elapses, computation results will be reset. The above operations will be carried out repeatedly until computation is stopped.
For a detailed description of the event/action function, refer to 9.1, “Setting Event/Action Functions” (page 9-1). Refer to pages 2-11 and 8-6 for a description of timers.

Status display during computation

The following status symbols are displayed in the sub-display 2 (lowest display section).

C : Computation is in progress.
X : Incomplete measurement has occurred. If this status occurs frequently, reduce the number of equations or make longer the measurement period. The number of equations may be too large for computation to be carried out within the specified measurement period.

Restrictions during computation

The following settings cannot be made while computation is in progress.

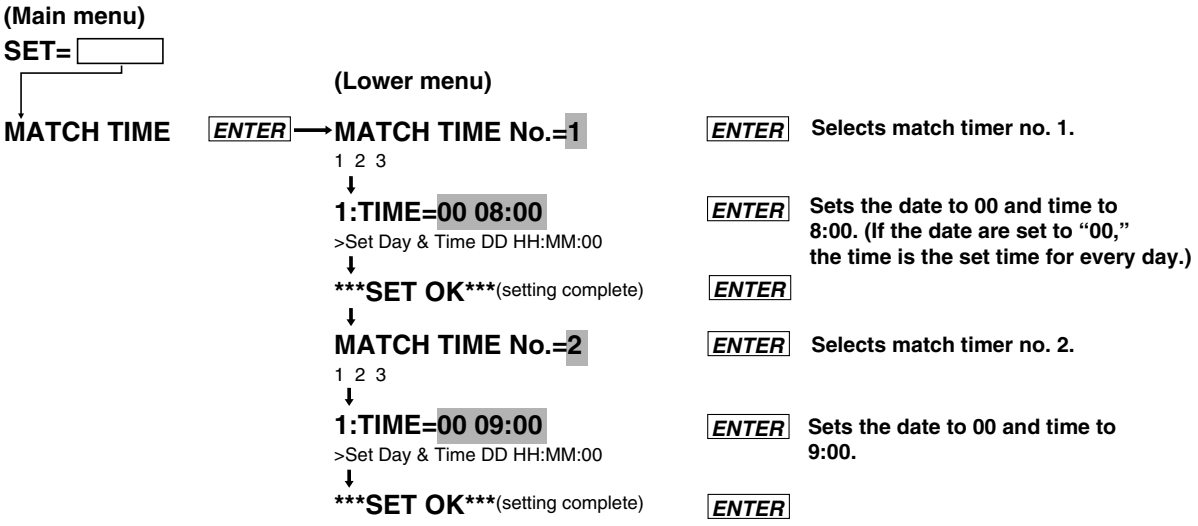
- Measuring range
- Computation equation/constant
- Group
- Inter-channel copying with RANGE COPY set to on

Examples of Setting Using the Event/Action Functions

• Sum the values measured on channel 001 from 8:00 to 9:00 every day.

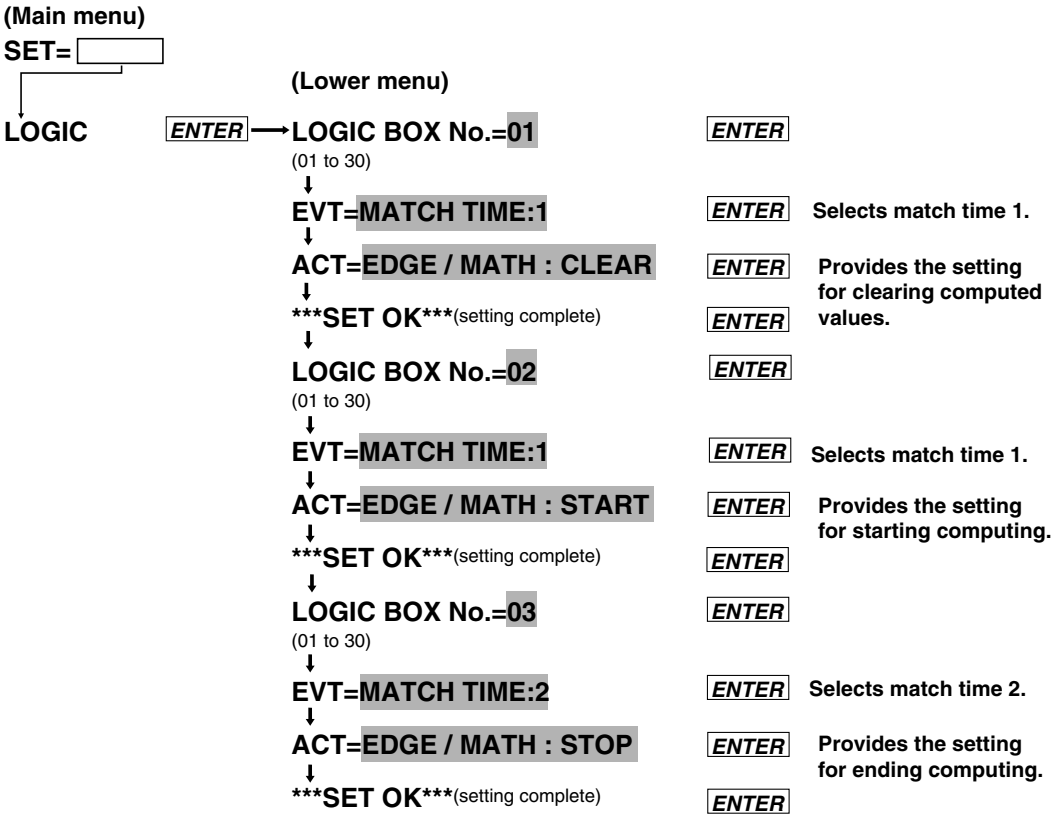
Setting the MATCH TIME field:

Configure the instrument so events occur at 8:00 and 9:00 every day.



Setting the EVENT/ACTION fields:

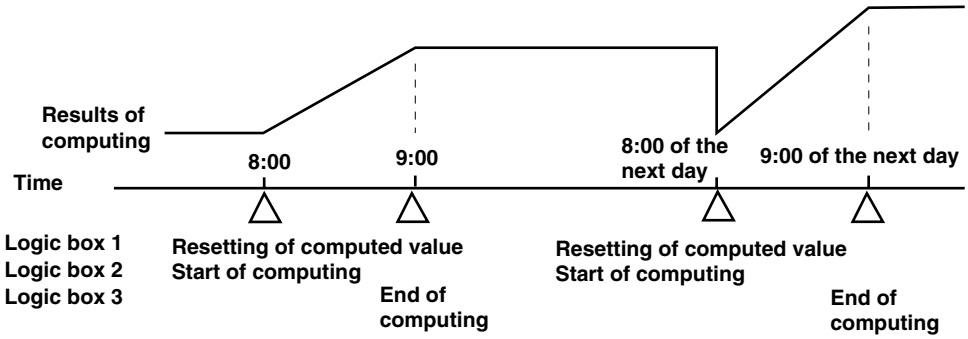
Configure the instrument so it uses the match time as the event to clear computed values and then start computing at 8:00 and ends computing at 9:00.



Computation equation:

CALC=TLOG.SUM (001)

If, in the event/action functions, you have assigned the same event to more than one LOGIC BOX number at the same time, the instrument executes computing, beginning with the smallest LOGIC BOX number. In the above configuration, the instrument clears computed values at 8:00 and starts computing. The values and behaviors of the event/action functions when computing is done with the above configuration are as follows:



• Sum the values measured on channel 001 every hour.

Setting the TIMER field:

Configure the instrument so an event occurs every hour with reference to the hour 00:00.

(Main menu)

SET= [ ]

(Lower menu)

TIMER [ENTER] → **TIMER No.=1** [ENTER]

1 2 3 4 5 6

↓

1: TIMER MODE=ABSOLUTE [ENTER] **Absolute time**

↓

1: TIME=1h [ENTER] **One-hour interval**

↓

1: REF TIME=00:00 [ENTER] **Sets the reference time.**

↓

*****SET OK*****(setting complete) [ENTER]

Setting the EVENT/ACTION fields:

Configure the instrument so it clears computed values at the time set on the timer.

(Main menu)

SET= [ ]

(Lower menu)

LOGIC [ENTER] → **LOGIC BOX No.=01** [ENTER]

(01 to 30)

↓

EVT=TIMER:1 [ENTER] **Selects timer 1.**

↓

ACT=EDGE / MATH : CLEAR [ENTER] **Resets the computed value.**

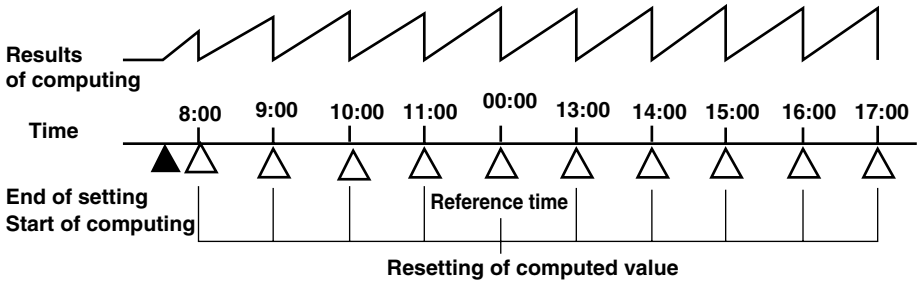
↓

*****SET OK*****(setting complete) [ENTER]

Computation equation:

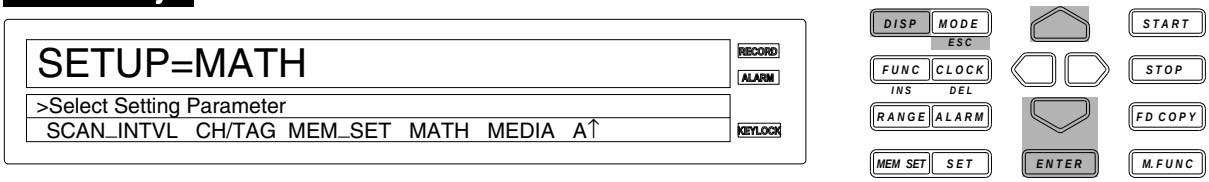
CALC=TLOG.SUM (001)

To start computing, press the FUNC key and select MATH START from the FUNC menu. The values and the behaviors of the event/action functions when computing is done with the above configuration are as follows:



12.6 Setting Actions to be Carried out in Case of Computation Error and Setting the Time Axis for TLOG. SUM

Relevant Keys



Operating Procedure

- Enter the SET UP menu in the following procedure:
  1. When the display presents the operation display mode or a menu other than the SET UP menu, first turn off the power switch.
  2. Turn the switch back on while pressing the DISP key and continue pressing the DISP key for about 5 seconds.
- Select/set using the keys.
- To escape from a lower menu, press the MODE (ESC) key. Its main menu will appear, although new settings/selections will not be kept.

(Main menu)

SET UP=

(Lower menu)

MATH → *ENTER* → **MATH ERROR= +OVER** → *ENTER*
+OVER -OVER
↓
TLOG TIME SCALE= /SEC → *ENTER*
OFF /SEC /MIN /HOUR
↓
TLOG CH ERROR= SKIP → *ENTER*
ERROR SKIP
↓
TLOG CH OVER= ERROR → *ENTER*
ERROR SKIP LIMIT
↓
TLOG PSUM OVER= OVER
OVER ROTATE
↓
*****MATH SET*****(End of setting) → *ESC* → (back to MATH)

Explanation

Displaying in case of computation error (MATH ERROR)

Used to determine whether +OVER or -OVER be displayed/saved in case of computation error.

Time axis scale for TLOG SUM (TLOG TIME SCALE)

For TLOG.SUM of time series, data is added at each measurement interval. However, in the case of an input having unit of /s, /min or /h like flow rate, the computation result will differ from the actual value, if addition of data is carried out. In this case, setting TLOG TIME SCALE according to the unit of the input will cause the data measured at measurement intervals to be processed according to the unit of the input.

For instance, if the measurement interval is 2s and input value is 100 m^3/min, the computation result will be 30000 after the elapse of one minute, since 100 is added every 2 seconds. Setting TLOG TIME SCALE to /min will cause the measured data to be multiplied by 2s/60s at each measurement interval, thus making the result close to the actual input value.
If this function is set to OFF, simple addition of data will be carried out.

Process of abnormal data during TLOG or CLOG (TLOG CH ERROR)

Used to select the process method for abnormal data obtained during TLOG or CLOG.

- ERROR : Abnormal data is processed as a computation error.
- SKIP : Abnormal data is ignored and computation is continued.

Process of overflow data during TLOG or CLOG (TLOG CH OVER)

Used to select the process method for overflow data obtained during TLOG or CLOG.

- ERROR : Overflow data is processed as a computation error.
- SKIP : Overflow data is ignored and computation is continued.
- LIMIT : Overflow data is treated as the next data for computation.
  Measurement channels to which linear scaling is applied: Specified scaling upper-/lower-limit
  Measurement channels to which no linear scaling is applied: Upper-/lower-limit of the measuring range
  Computation channels: Specified LEFT/RIGHT value

Processing of the results of TLOG.PSUM computation (for pulse input)

- OVER: If the result of a separate calculation of TLOG.PSUM (XXXX) exceeds 99999999, the instrument goes into an overflow.
- ROTATE: If the result of a separate calculation of TLOG.PSUM (XXXX) exceeds 99999999, the instrument resets the value subsequent to 99999999 to 0 and continues computing. For example, if the measured data subsequent to 99999999 which has been reached is 3, the computed result becomes “2” by counting 0, 1 and 2.

The process is effective only when a pulse input module is installed.

13.1 Periodic Maintenance and Recommended Parts Replacement Period

Periodic maintenance

Check the instrument's operation periodically to keep it in good operating condition. Especially check the following items and replace consumable parts as needed. Do not use a lubricant for periodic maintenance.

- Are display and data saving functioning properly?

If problems develop with the instrument, see Section 13.3, "Troubleshooting."

Recommended parts replacement period

It is necessary that the instrument's parts be replaced periodically for use of the instrument over an extended period of time. The table below shows the recommended parts replacement periods for specific parts that wear out. These replacement periods indicate where the instruments have been used under normal operating conditions. When replacing parts, refer to these replacement periods taking the actual operating conditions into consideration. When replacing parts other than fuse, please contact your nearest Sales representative. Addresses may be found on the back cover of this manual.

Part	Part number	Replacement period (in years)	Description
Display	B9233KJ	3.4	30,000 hours
Fuse	A1350EF	2	For AC power supply (2.5A, time-lag fuse)
	A1354EF	2	For DC power supply (6.3A, time-lag fuse)
Lithium battery	B9234XZ	10	For backup of information that has been set

13.2 Replacing the Fuse

WARNING

- The fuse must be of the specified rating (current, voltage, type) to prevent a fire hazard.
- Turn off the source of the DC power supply. Also, on the DC power supply model, remove the DC power supply connector from the DC power supply terminal.
- Never short-circuit the fuse holder.

Fuse Rating:

The fuse must have the following specifications:

For models with AC power supply

Maximum rated voltage: 250 V Maximum rated current: 2.5 A Type: time-lag
Standard: IEC/VDE certified Part number: A1350EF

For models with DC power supply

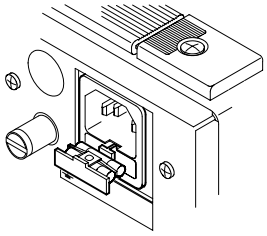
Maximum rated voltage: 250 V Maximum rated current: 6.3 A Type: time-lag
Standard: IEC/VDE certified Part number: A1354EF

Replacement procedure:

To replace the fuse, proceed as follows:

For models with AC power supply

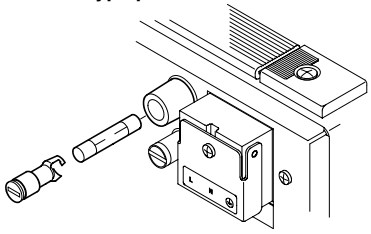
1. Turn off the power switch.
2. Turn off the source of the DC power supply.
3. Unplug the power cord from the power outlet.
4. Remove the fuse holder below the power connector on the rear panel.
5. Remove the blown fuse from the holder.
6. Insert a new fuse into the holder and then install the holder in place.



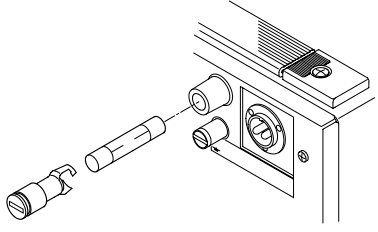
For models with the screw-type power terminals or DC power supply

1. Turn off the power switch.
   Turn off the source of the DC power supply. Or for DC power supply model unplug the DC power supply connecter from DC power supply terminal.
2. Disconnect the power connections.
3. Use a standard screwdriver to turn the fuse-holder screw counterclockwise, located next to the power terminals. Then remove the fuse holder.
4. Remove the blown fuse from the holder.
5. Insert a new fuse into the holder and then install the holder in place.

Screw-type power terminal



DC power supply model



Note

The fuse is located in the subunit. This fuse may not be replaced by the customer. For replacement, contact your nearest representative. The fuse ratings are 250V2A time lag fuse certified by IEC/VDE for an AC power supply. It is a 250V 6.3A time lag fuse certified by UL/CSA for a DC power supply.

13.3 Troubleshooting

If an error code appears on the display, see Section 13.4, “Error Codes.”
If servicing is necessary, or if the instrument is not operating correctly though the following corrective actions have been taken, please contact Yokogawa Engineering Service Corporation. Addresses may be found on the back cover of this manual.

Problem	Probable Cause	Corrective Action
Collector does not operate.	Power switch is off.	Turn on the power.
	Power supply is not connected properly.	Connect properly.
	Supplied power does not meet power requirements.	Use power meeting its requirements.
	Fuse blown.	Replace fuse. (If the fuse blows immediately after turning on the power, servicing will be required.)
Output beyond its limits Fluctuating indication.	Input specifications are not correct.	Correct input specifications.
	Incorrect measuring range or span	Change measuring range or span.
	Noise superimposed.	Connect input wiring far away from noise source.
		Ground collector.
		Ground measurement object.
		Isolate thermocouple from measurement object.
		Use shielded wiring for input line.
		Change A/D integral times.
		Use moving average.
		Use input filter.
	No countermeasure taken against ambient temperature changes.	Install input terminal cover properly.
		Protect collector from blowing air of fan.
		Keep temperature changes near input terminals small.
	Input connected improperly.	Connect input properly.
		Connect module properly.
		Tighten screws properly.
		Isolate RTD from ground.
		Replace disconnected thermocouples.
	Collector connected in parallel with other instruments.	Do not use burnout functions in other instruments.
		Ground collector and other instruments in the same ground line.
		Do not connect collector in parallel with other instruments (for use with dual-element TC).
	RJC set improperly (for TC input)	Set RJC properly.
	Other cause.	Contact Yokogawa Engineering Service.
Defective display	Noise superimposed.	Lay input wiring far away from noise source.
		Ground collector.
		Ground measurement object.
		Isolate TC from measurement object.
		Use shielded wires for input line.
		Change A/D integration times.
		Use input filter.
Data indicates “xxxxxx”	Input module connected improperly	Connect input properly.
Collector does not work even with operation key pressed.	Keylock not released.	Disable keylock functions in setup mode.
	Collector set in remote mode.	Set collector in local mode.
	Other cause.	Contact Yokogawa Engineering Service.
Setting cannot be operated.	A module is not connected properly.	Connect properly.
	The extension cable is not connected properly.	Connect properly.
	There is no system recognition.	Execute the system structuring menu.

13.4 Error Codes

First, confirm that the system is properly constructed. In particular, if you have newly purchased our product, thoroughly read "Structuring System Modules" (page 3-32) to construct the system. If servicing is necessary, or if the instrument does not operate correctly even though the following corrective actions have been taken, contact your nearest Sales representative. Addresses may be found on the back cover of this manual.

Error Code	Error	Corrective Action
001	System error.	Contact your nearest representaive.
002	Set data out of range.	Set numeric data correctly.
003	Time set incorrectly.	Set time correctly.
004	Channels set incorrectly.	Set channels correctly.
005	Invalid setting function parameter.	Set parameter correctly.
006	Invalid character string.	Set character string correctly.
007	Invalid type of input for input module.	Set the type of input correctly.
008	Invalid range setting for input module.	Set range correctly.
009	Numeric values out of range.	Set numeric values correctly.
030	There may be a module that cannot be set in channels with continuous ranges.	Re-set ranges or channels with continuous ranges.
031	There may be an invalid module in channels with continuous ranges.	Change channels in which continuous ranges are set.
040	Reference channel number greater than that of the channel for interchannel differential computations.	Change the reference channel number.
041	Skipped range in the reference channel for interchannel differential computations.	Change the range in the reference channel.
042	RRJC range in the reference channel for interchannel differential computations.	Change the range in the reference channel.
043	SCALE in range setting in the reference channel for interchannel differential computations.	Change the range in the reference channel.
044	The reference channel for interchannel differential computations does not exist.	Change the reference channel number.
045	The left and right spans are identical.	Change the span setpoint.
046	The left and right scale values are identical.	Change the scale setpoint value.
060	The alarm setting was made in the channel where SKIP was set.	Change ranges.
061	The alarm was set to a channel with ranges where alarm setting cannot be set.	Change ranges.
062	The alarm setpoint is out of range in a channel with continuous ranges.	Set correct alarm setpoint.
063	Relay number set incorrectly.	Set relay number correctly.
080	Invalid character strings for group setting.	Set character strings correctly.
081	Invalid channel in character string for group setting.	Set channel correctly.
089	Copy channel setting error.	Set the correct channel.
090	Attempted to copy a message with the same source and destination number.	Change copy source or destination.
091	Illegal protocol for logic setting.	Set correct protocol.
100	No equation option	Not possible to make any computation settings.
101	Invalid code in the equation	Set the equation correctly.
102	Incorrect number of ( ) in the equation	Set the correct number of ( ).
103	Syntax error	Set the equation correctly.
104	Illegal character(s) or code(s) is used before or after an operator.	Set the equation correctly.
105	The right and left spans are the same.	Change the span.
106	Attempted to make range setting during computation.	Stop making range setting.
110	Syntax error for computation constant	Set the constant correctly.
111	Out of constant setting range	Set the constant within the range.
120	Floppy disk not inserted or not formatted.	Insert a formatted floppy disk into the drive.
121	Insufficient memory	Delete unnecessary files.
122	Incorrect file name or volume name	Set the correct file name or volume name.

123	Attempted to make settings which are not allowed to be made during saving of measured data.	Stop making the settings.
124	Too many files in the media	Delete unnecessary files.
125	Attempted to read data which was saved by another instrument model.	Select data which has been saved by DR/DA/DC.
127	Attempted to save data in a write-protected file.	Cancel write-protection.
128	No event/action has been set.	Set the desired action .
130	Incorrect channel found during saving of measured data.	Set the correct channel.
131	Media writing operation error	Change the media to write to
132	Attempted to format the disk while a file is open.	Close the file.
134	Set-up data saving error	
135	Internal data error	
136	Incorrect copy channel	Set the correct copy channel.
137	Computation is started while set-up data is being saved or read.	Stop Computation.
138	Floppy disk error	Use another floppy disk.
139	Other media related error	
140	Subunits selected which are not connected, or the power is not supplied.	Specify correct subunits.
141	Disconnected modules were selected.	Specify correct modules.
143	Modules selected which cannot be calibrated.	Specify correct modules.
144	Calibration done improperly.	Check electrical connections. Calibrate again. If the same error occurs again, contact your nearest Sales representative.
145	Hardware becomes faulty during calibration.	Turn off the power and then on. Calibrate again. If the same error occurs again, contact your nearest Sales representative.
160	While suspending the writing of measured/computed data using a level action, writing start cannot be executed.	Change the setting.
161	An attempt is made to write the data of one scan while writing of the measured/computed data has been suspended.	Press the START key to enable writing of the measured/computed data. The scan data will be written.
162	While suspending the writing of measured/computed data using a level action, a writing suspension/resumption cannot be executed using the START and STOP keys.	Change the setting.
163	While the writing of measured/computed data is operating, writing is tried again.	Either stop writing the data and then restart, or stop writing altogether.
164	While copying a file, copying is tried again.	After completing the presently executed copying, start the next copying.
165	There is no file to be copied.	After creating a file, execute copying.
166	There is an attempt to set a writing period which is not a multiple of the measuring period.	Change the setting.
167	Although a file remains in the built-in RAM disk, there is an attempt to change the saving method.	Change the saving method after deleting all the files or initializing the RAM disk.
168	Attempted to start writing the report file when all the report settings of the setup mode are set to OFF.	Set the report setting to ON in the setup mode.
170	The IP address does not belong to any of the classes, A, B, or C.	Set the correct IP address.
171	There is a hole in the mask or the host address section is not released.	Set the correct subnet mask.
172	The net address section including the subnet does not match the subnet section of the IP address.	Set the correct not address.
173	The host address section of the IP address is either all zeroes or all ones.	Set the correct IP address.

ROM ERROR	System ROM error	Contact your nearest sales representative.
ROM ERROR	System ROM error	Contact your nearest sales representative.
RAM ERROR	Main memory error	Contact your nearest sales representative.
RAM-DISK ERROR	RAM disk error	Contact your nearest sales representative.
FLOPPY ERROR	Floppy disk error	Contact your nearest sales representative.
SCSI ERROR	SCSI controller error	Contact your nearest sales representative.
FLOPPY & SCSI ERROR	Floppy disk and SCSI controller error.	Contact your nearest sales representative.
MAIN NV READ ERROR	Internal nonvolatile memory read error	Contact your nearest sales representative.
MAIN NV WRITE ERROR	Internal nonvolatile memory write error	Contact your nearest sales representative.
SYSTEM ERROR ☐☐ (☐☐ : number)	System error ☐☐ (☐☐ : number)	Check whether each unit or power code is connected properly after turning off the power switch. If the same error occurs again even though you turn on the power switch, contact your nearest sales representative.
RESET ERROR	An error occurs between the main unit and communication module.	Same as above.

13.5 Calibration

Overview

We recommend that you calibrate the DC100 at least once a year to assure its measurement accuracy. When calibrating, please contact your nearest Sales representative at its address on the back cover of this manual.
Press and hold the MODE key and then turn on the power switch to place the instrument in the calibration mode. Select the subunit and module to calibrate the instrument on a module basis. After completing the calibration, turn off the power and then turn it back on when resuming the measurements.

CAUTION

You can use the DISPLAY mode only for a calibration adjustment. If it is maladjusted, the instrument may become faulty. For details, please contact your nearest Sales representative.

Calibration needs selection of:
- a subunit and module and;
- the calibration mode.

Once the subunit and module have been selected, they are no longer selected again as long as the calibration END mode is not executed.

Input modules to be calibrated

- Universal input module
- DCV/TC/DI input module
- mA-input module
- Strain input module
- Retransmission module

Calibration mode

- CAL/EXEC mode: This mode enables specified ranges to be calibrated.
- DISPLAY mode: This mode enables current calibrated values to be displayed.
- END mode: This mode enables calibrated values to be stored in the internal nonvolatile memory and terminates the calibration mode. (If ABORT is selected, the calibrated values are not stored in memory.)

Subunit/module selection error

The following error messages are displayed:
- The specified subunit remains disconnected. Or the power supply is not turned on (ERROR 140).
- The specified module remains disconnected (ERROR141).
- The specified module is such that it cannot be calibrated (ERROR143).

Calibrated data error

The following error messages are displayed:
- Attempted to remove the module during calibration. Or hardware error: ERROR145
- Invalid calibrated data: ERROR144
- Attempted to set invalid numeric values in the DISPLAY mode: ERROR145

Note

When a calibrated data error appears, the error data are stored in memory.

Preliminary

Required Equipment

Name	Measurement Range	Accuracy	Recommended
DC Voltage Generator	0 V to 50 V	0.005% of setting+1 μV	Yokogawa 9000*, 4808
DMM	0 V to 50 V	0.005% of setting+1 μV	HP3458A
Decade Resistance Box	0.1 Ω to 1000 Ω	0.01%	Yokogawa 2793
DC Current Generator	0 to 20 mA	0.05% of setting	Yokogawa 7651

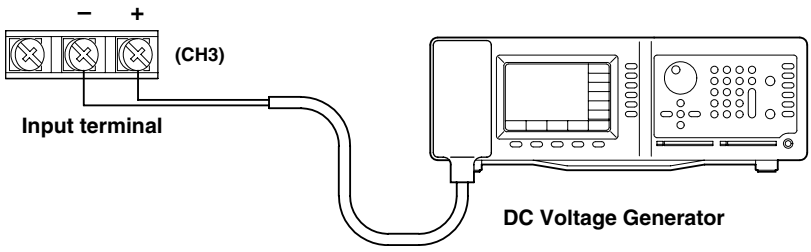
* For 0V input, it is necessary to either short the input terminals, or to monitor the output voltage using the DMM.

Calibrating Conditions

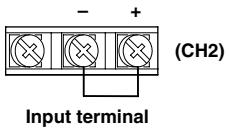
Ambient temperature : 23°C±2°C
Ambient humidity : 55 ±10% RH
AC power supply voltage : 100 to 240 V AC (when using AC power supply model or AC adapter)
DC power supply voltage : 12 to 28 V DC (when using DC power supply model)
AC power supply frequency : 50/60 Hz ±1% (when using AC power supply model or AC adapter)
Warm-up time : at least 30 minutes for this instrument, and necessary warm-up time for the used equipment

Connection (terminal screw connections)

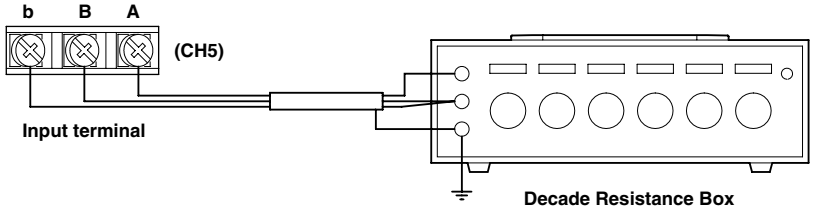
- **DC Voltage Measurement**
  - Apply a rated voltage in the voltage range that is to be calibrated to channel 3.



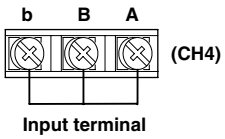
  - Short-circuit between "+" and "–" terminals in channel 2.



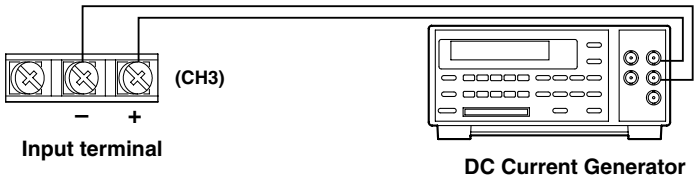
- **Temperature Measurement Using RTD**
  - Apply the 100 Ω resistance to channel 5.



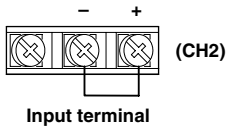
  - Short-circuit the resistance input terminals A, B, and b in channel 4.



- **DC Current Measurement**
  Apply the 20mA to channel 3

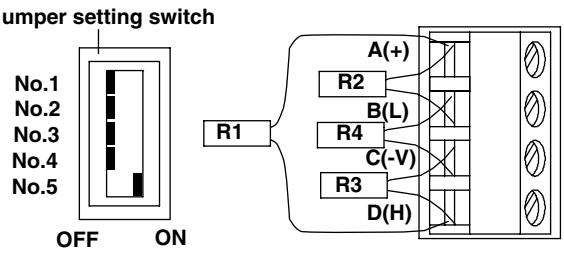


Short-circuit between "+" and "–" terminals in channel 2.



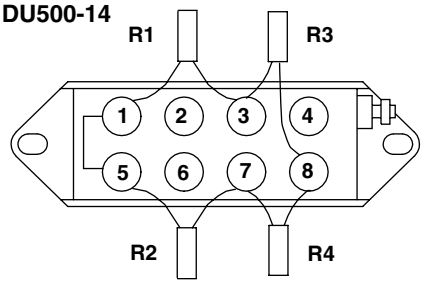
- **Strain Measurement**
  Perform calibrations using 4-gauge method.
  Use a 319300 bridge box for the DU500-14's bridge box.
  Wire the strain gauge or the bridge box to the channel 2.

DU500-12/DU500-13



No.1	No.2	No.3	No.4	No.5
OFF	OFF	OFF	OFF	ON

DU500-14



To R1 to R4, connect resistors with the specifications described below.

Calibration	Resistors R1, R2 and R3	Resistor 4	Accuracy
ZERO	120.000	120.000	±0.005%, ±0.3 ppm/°C
2 k SPAN	120.000	119.521	±0.005%, ±0.3 ppm/°C
20 k SPAN	120.000	115.294	±0.005%, ±0.3 ppm/°C
200 k SPAN	120.000	80.000	±0.005%, ±0.3 ppm/°C

- **Voltage or Current Output Using Retransmission Module**
  When clibrating the retransmission module by confirming the output value, connect a DMM (a product corresponding to HP3458A) to the terminal to be calibrated.

Operating Procedure

Entering the calibration mode

1. While pressing and holding the MODE key, turn on the power.

Selecting the subunit and module numbers

2. With ⌂▽, select the subunit number.

```
S_UNIT0 : MODULE   No=0

>

0  1  2  3  4  5
```

3. With ⌂▽, move the cursor.
4. With ⌂▽, select the module number.

```
S_UNIT0 : MODULE   No=0

0  1  2  3  4  5
```

5. Press the ENTER key.

- **Universal input, DCV/TC/DI input, mA-input, or Strain input module**
  Calibrating in CAL/EXEC mode

6. With ⌂▽, select the CAL/EXEC mode.

```
ADJUST   MODE=CAL/EXEC

>S_UNIT0 : MODULE   No=0

DISPLAY   CAL/EXEC   END
```

7. Press the ENTER key.

- **Selecting the calibration range**

8. With ⌂▽, select the calibration range.

```
ADJUST   RANGE=20mV

>S_UNIT0 : MODULE   No=0

20mV   60mV   200mV   2V   6V   20V   50V   Pt : 1mA   P↑
```

9. Enter the rated value in the selected range.
10. Press the ENTER key to execute calibration. During the calibration, the following display appears.

```
A/D   Adjusting

>S_UNIT0 : MODULE   No=0

20mV   60mV   200mV   2V   6V   20V   50V   Pt : 1mA   P↑
```

11. After calibration is completed, the following display appears.

```
* * *  CALC END  * * *

>S_UNIT0 : MODULE   No=0

>ADJUST RANGE=20mV
```

12. Press the ENTER key.

Checking calibrated values in the DISPLAY mode

Use this mode only for checking calibrated values. In this mode, you can adjust a calibrated value, but, if this value is invalid, the instrument may be inoperative. For details, contact your nearest Sales representative.

13.With , select the DISPLAY mode.

```
ADJUST   MODE=DISPLAY

>S_UNIT0 : MODULE   No=0

DISPLAY   CAL/EXEC   END
```

14.Press the ENTER key to display the calibrated-value display items.

The following shows where the universal input modules are calibrated.
The calibrating procedures for DC V/TC/DI input modules are those except RTD in universal input modules.

- **Displaying the calibrated values**

15.The calibrated values are displayed as follows:

```
20mV   ZERO=–          1

>S_UNIT0 : MODULE   No=0

>
```

16.Press the ENTER key.

17.Display the calibrated-value display items in the following order:
Repeat steps 15 and 16 above.
20 mV SPAN → 60 mV ZERO → 60 mV SPAN → 200 mV ZERO → 200 mV SPAN → 2 V ZERO → 2 V SPAN → 6 V ZERO → 6 V SPAN → 20 V ZERO → 20 V SPAN → 50 V ZERO → 50 V SPAN → Pt: 1 mA ZERO → Pt: 1 mA SPAN → Pt: 2 mA ZERO → Pt: 2 mA SPAN → Pt: 1 mA-H SPAN → Pt: 2 mA-H SPAN → Cu: 2 mA ZERO → Cu: 2 mA SPAN
For a mA-input module, show the calibrated values in the order, 20 mA ZERO and 20 mA SPAN. For a strain input module, show the calibrated values in the following order:
2k ZERO, 2k SPAN, 20k ZERO, 20k SPAN, 200k ZERO and 200k SPAN.
For a digital input module, show the calibrated values in the following order,
60 mV ZERO, 60 mV SPAN, 6 V ZERO, 6 V SPAN.

18.After checking the [Cu: 2 mA SPAN] calibrated value in the above calibrated-value display items, press th e ENTER key.

```
* * * DISPLAY   END * * *

>S_UNIT0 : MODULE   No=0

>
```

19.Press the ENTER key.

Completing the selected module calibration with the END mode

20.With ⌂▽ , select the END mode.

```
ADJUST   MODE=END
>S_UNIT0 : MODULE   No=0
DISPLAY   CAL/EXEC   END
```

21.Press the ENTER key.

- **Selecting STORE or ABORT**

22.With ⌂▽ , select STORE or ABORT.

```
A/D   ADJUST   END=ABORT
>S_UNIT0 : MODULE   No=0
ABORT   STORE
```

23.Press the ENTER key. Return to operation 2.

Terminating the calibration mode

24.When you return to normal measurement after completing calibration, turn off the power and then back on.

- **Retransmission module**

Calibrating in CAL/EXEC mode

6. Using ⌂▽, select the CAL/EXEC mode.

```
ADJUST  MODE = CAL/EXEC
>S_UNIT: MODULE  No = 0
DISPLAY  CAL/EXEC  END
```

7. Press the ENTER key.

- **Selecting the channel to be calibrated**

8. Using ⌂▽, select the channel to be calibrated.

```
CAL CH = 02 : ZERO
>
01  02  03  04  05  06  07  08  09  10
```

9. Using ◁▷, move the cursor.

10.Select ZERO or FULL.

11.Press the ENTER key.

```
CAL OUT=   681
>  ZERO Adjust (     615~  751   )
```

12. Set the ZERO value so that 1 V or 4 mA is output. The setting rane is from 615 to 751. Set the FULL value so that 5 V or 20 mA is output. The setting rane is from 3276 to 3550.

13.Press the ENTER key to execute calibration.

14. After calibration is completed, the following display appears.

```
*  *  *  CAL/EXEC END  *  *  *
> S_UNIT = FMODULE  No=0
> CAL CH = 02 : CAL OUT=  681
```

15. Press the ENTER key.

Checking calibrated values in the DISPLAY mode

Use this mode only for checking the calibrated values. It is possible for you to adjust the calibrated value in this mode, but, depending on the adjustment, the instrument may become inoperative. For details, contact your nearest YOKOGAWA dealer.

16. Using ⌂▽, select the DISPLAY mode.

```
ADJUST  MODE = DISPLAY

> S_UNIT: MODULE  No = 0

DISPLAY  CAL/EXEC  END
```

17. Press the ENTER key to display the calibrated items.

- **Displaying the calibrated value**

18. The calibrated value is displayed.

```
1CH  ZERO=      681

> S_UNIT: MODULE  No = 0

>
```

19. Press the ENTER key.
20. Then, the calibrated values are displayed in the following order:
    CH1 FULL → CH2 ZERO → CH2 FULL → CH3 ZERO → CH3 FULL → CH4 ZERO → CH4 FULL → CH5 ZERO → CH5 FULL → CH6 ZERO → CH6 FULL → CH7 ZERO → CH7 FULL → CH8 ZERO → CH8 FULL → CH9 ZERO → CH9 FULL → CH10 ZERO → CH10 FULL
21. After checking the calibrated value of the SPAN for CH2 (DT500-21) or CH10 (DT500-11), press the ENTER key. Calibration in the DISPLAY mode will be terminated.

```
* * *  DISPLAY  END  * * *

> S_UNIT: MODULE  No = 0

>
```

22. Press the ENTER key.

Completing the calibration of the module selected in the END mode

23. Using ⌂▽, select the END mode.

```
ADJUST  MODE = END

> S_UNIT: MODULE  No = 0

DISPLAY  CAL/EXEC  END
```

24. Press the ENTER key.
25. Using ⌂▽, select STORE or ABORT.

```
A/D  ADJUST  END = ABORT

> S_UNIT: MODULE  No = 0

ABORT  STORE
```

26. Press the ENTER key. Return to operation 2.

Terminating the calibration mode

27. To exit the calibration mode and start normal measurements, power cycle the instrument.

Explanation

CAL/EXEC mode (for calibration of a specifie range)

- **Items for calibration range**
  - Items for the calibration range vary depending on the type of module to be calibrated.
  - For use with universal input modules, select the items for the calibration range from among the following:
    20 mV/60 mV/200 mV/2 V/6 V/20 V/50 V/Pt: 1 mA/Pt: 2 mA/Pt: 1 mA-H/Pt: 2 mA-H/Cu: 2 mA
  - When the DC V/TC/DI input module is selected, RTD in the universal input module is not displayed.
  - The choice is 20 mA only for mA-input modules.
  - For strain input modules, select from 2 k, 20 k, 200 k and INIT.
    INIT: Set defaults in the A/D Adjustment section. Calibration is necessary, however, after execution.
  - For digital input modules select form 60 mV and 6 V.

- **Displaying error messages**

  The following error messages are displayed.
  - Attempted to remove the module during calibration. Or, hardware error: ERROR145
  - Invalid calibrated data: ERROR144
  - Error generation in initial balance when making adjustments: ERROR146

Note

- When calibrating a high-precision RTD (Pt: [ ]-H), do so after calibrating the voltages to maintain accuracy.
- When a calibrated data error appears, the error data are stored in memory.
- If ERROR145 appears, turn off the power and then back on to restart operation. If the same error occurs again, the recorder may be defective.
- If ERROR144 or 146 appears, check the electrical connections and input data. If the same error occurs again, the module to be calibrated may be defective.
- When calibrating a strain input module, first calibrate zero (ZERO) and then the span (SPAN).

DISPLAY mode (to display and adjust the calibrated value)

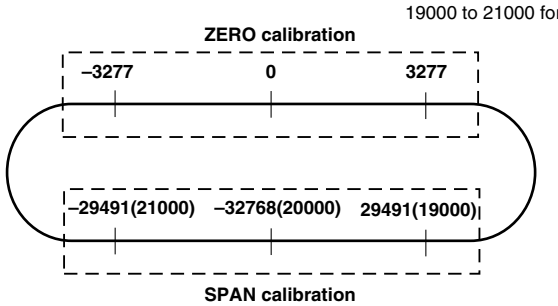
Use this mode only for checking the calibrated value. In this mode, you can adjust the calibrated value, but, if it is invalid, the instrument may be inoperative. For details, contact your nearest Sales representative.

- **Calibrated-value display items**
  - Calibrated-value display items vary depending on the type of module to be calibrated.
  - For use with universal input modules, display calibrated-value display items in the following order:
    20 mV ZERO → 20 mV SPAN → 60 mV ZERO → 60 mV SPAN → 200 mV ZERO → 200 mV SPAN → 2 V ZERO → 2 V SPAN → 6 V ZERO → 6 V SPAN → 20 V ZERO → 20 V SPAN → 50 V ZERO → 50 V SPAN → Pt: 1 mA ZERO → Pt: 1 mA SPAN → Pt: 2 mA ZERO → Pt: 2 mA SPAN → Pt: 1 mA-H SPAN → Pt: 2 mA-H SPAN → Cu: 2 mA ZERO → Cu: 2 mA SPAN
  - For a mA-input module, show the calibrated values in the order, 20 mA ZERO and 20 mA SPAN. For a strain input module, show the calibrated values in the following order: 2k ZERO, 2k SPAN, 20k ZERO, 20k SPAN, 200k ZERO and 200k SPAN.
    For a digital input module, show the calibrated values in the following order, 60 mV ZERO, 60 mV SPAN, 6 V ZERO, 6 V SPAN.
  - When the DC V/TC/DI input module is selected, the displayed values for RTD in the universal input module can be modified without influencing operation of the recorder.
  - The calibrated values appear in the above order each time the ENTER key is pressed. If the MODE key is pressed while displaying calibrated values, the display returns to "A/D calibration mode selection," and the calibrated value already adjusted before pressing the MODE key is canceled. Calibrated values are effective immediately after terminating the DISPLAY mode.

- **Adjustable range and error display**
  - Adjustable ranges are -32768 to 32767 (except 16384, -16384, 16385 and -16383).
  - If the following numeric values are set, errors appear.
    Outside the range from -32768 to 32767: ERROR002
    16384 or -16384: ERROR145
    16385 or -16383: ERROR144

Note

- In the adjustable ranges, if the following are not satisfied, the adjusted module is recognized as an error module.
  - Calibrated value (ZERO) : -3277 to 3277 (ideal value = 0)
  - Calibrated value (SPAN) : 29491 to -29491 (ideal value = -32768)



- When calibrating the DCV/TC/DI input module, you need not calibrate an RTD.

END mode (storing a calibrated value in the internal nonvolatile memory)

Select one of the following two:

- STORE : Stores data in the internal nonvolatile memory.
- ABORT : Cancels the storage of data in the internal nonvolatile memory.

14.1 Specifications of DC100/DS400/DS600

Style Numbers **DC100: S8**
DS400/DS600: S8

Available Modules for the DC100 Stand-alone Model

Input modules : universal (DC voltage, TC, RTD, contact), DCV/TC/DI, mA, Power monitor, Strain, Pulse
Alarm modules : 4-ch output (transfer contact) or 10-ch output (make contact); the number of channels can be increased by adding modules.
Communication interface modules : Selectable from GP-IB, RS-232C and RS422-A/RS-485
DI/DO modules : 2-ch alarm output (transfer contact), 1-ch fail output, 1-ch file alarm output, and remote control signal input for data saving functions (12 points)
Number of modules which can be connected : 4
DI/DO module: not more than one
Input module: max. four
Input module + alarm module + DI/DO module + communication interface module: max. four

Connecting Subunits to the DC100 Expandable Model

Types of Subunits

Subunit DS400: four modules
Subunit DS600: six modules

Number of Subunits which can be connected

Up to six units can be connected (either DS400 or DS600)

Connection method

Using dedicated cables

Available Modules for the DC100 Expandable Model

Main Unit

Communication interface modules : Selectable from GP-IB, RS-232-C and RS-422-A/RS-485
DI/DO modules : 2-ch alarm output (transfer contact), 1-ch fail output, 1-ch file alarm output and remote control signal input for data saving functions (12 points)
Alarm modules : 4-ch output (transfer contact), or 10-ch output (make contact)

- Number of modules which can be connected: 4
  Communication module + DI/DO module + alarm module: not more than four

Subunit

Input modules : universal (DC voltage, thermocouple, RTD, contact), DCV/TC/DI, mA, Power monitor, Strain, Pulse
Alarm modules : 4-ch output (transfer contact) or 10-ch output (make contact)
DI/DO modules : 2-ch alarm output (transfer contact), 1-ch fail output, 1-ch file alarm output and remote control signal input for data saving functions (12 points)

- Number of modules which can be connected to one DS400: 4
  Input module + alarm module + DI/DO module: max. four
- Number of modules which can be connected to one DS600: 6
  Input module + alarm module + DI/DO module: max. six

* Only one DI/DO module can be connected to one system.

Input

Measurement range/accuracy/resolution

Refer to 14.2 on page 14-10.

Measurement interval

Selectable from 0.5, 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 s.
(with 10-ch input module, filter: OFF, A/D integration period of 20 ms (50 Hz) or 16.7 ms (60 Hz))
Stand-alone model: max. 500 ms/40 ch
Expandable model: max. 500 ms/300 ch

A/D integration time (for DU100/DU200)

Selectable from 20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (10 Hz), or automatically switched between 50/60 Hz. (Except, auto switch does not function on the stand-alone DC power supply model or the subunit (DS400/DS600) of a DC power supply model.)

Number of inputs

Stand-alone model: max. 40
Expandable model: max. 300

Data Saving Function

Media for data save

Buffer memory (internal SRAM)
- Capacity: 1 MB (standard), 2 MB or 4 MB (option)
- Data backup: Around 10 years (backup with lithium battery, at room temperature while power is off)
- Memory usage: Specify division into 2, 4, 8 or 16, or a data length.
- Specifiable data length: 10 data/ch to 100000 data/ch (Total memory length must be within 1 MB.)

3.5-inch floppy disk
- Number of drives: 1
- Disk types: 2HD, 2DD
- Supported formats: 1.2 MB, 1.44 MB, and 720 KB

Applicable data

Setting values, measured values, and computed values (only possible when optional math function is specified)

Saving to floppy disk

Measured/computed values: Copies data stored in the buffer memory to the floppy disk.
Setting values: Directly saved to the floppy disk.

Loading from floppy disk

Measured/computed values: Not able to be loaded to the buffer memory.
Setting values: Directly loaded from the floppy disk.

Data save format

Setting values: ASCII
Measured/computed values: binary (except ASCII (CSV Format) is also possible when saving to floppy disk.)

Data capacity

Setting values
- Stand-alone model: max. about 20 KB (when saving the setting values of an operation mode with 40 ch inputs and 30 ch computations)
- Expandable model: max. about 80 KB (when saving the setting values of an operation mode with 300 ch inputs and 60 ch computations.)

Measured values
- Binary data: 2 bytes / 1 data
- ASCII data: 12 bytes / 1 data

Computed values
- Binary data: 4 bytes / 1 data
- ASCII data: 12 bytes / 1 data

Equation to calculate the total data capacity
- Stand-alone model: 256 + 64 × (number of measured ch + number of computation ch) + (number of measured ch × 2 + number of computation ch × 4 + 6) × specified data length
- Expandable model: 576 + 64 × (number of measured ch + number of computation ch) + (number of measured ch × 2 + number of computation ch × 4 + 6) × specified data length

Writing interval of measured/computed values

Measurement interval, or selectable from 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 s; 1, 2, 3, 4, 5, 10, 30, 60 min; LOGIC (Using the event/action function as well as the FUNC menu, it can also sample 1 data at a time, e.g. at each M.FUNC key or remote control signal input.)

Selection of the writing method of measured/computed values (WRITE MODE)

Single: Start writing the data when the key operation occurs or the trigger condition is met. After writing a file of data, stop the writing process.
Repeat: Start writing the data when the key operation occurs or the trigger condition is met. Repeat the process of writing data to 1 file, until there is no more area in the memory.
None: The measured/computed data is not wiriten (only for the /M3 option).

Trigger condition
All Trigger conditions are configured with the event/action function (such as key operation, remote control signal, alarm status, and file end).
Pretrigger: 0 to 100% (can be specified in 10% intervals)
Filename when saving data
Measured/computed values: Selectable from automatic setting and user setting. For user setting, 5 ASCII characters input (last 3 letters are set automatically from 001 to 200).
Setting values: 8 ASCII characters input.

Display

Display method
VFD (5 × 7 dot matrix, 3 rows)
Number of characters
Main display: 22 large characters (1 row); Sub-display 1 and 2: 40 small characters (2 rows)
Displayed contents
Digital value display: data for freely selected channels can be displayed on each row (1 channel per line, max. 5 rows); channel No. or tag (up to 7 characters); alarm search; measurement values; engineering unit
Bargraph display: measurement data of the main display are displayed as a bargraph
Auxiliary data: clock, alarm status, alarm relay status, keylock ON/OFF, data saving operation, file utilization, memory utilization

Alarms (when equipped with Alarm module)

Number of settings
Up to four alarms can be set for each channel.
Kind of alarms: selection from higher limit, lower limit, difference higher limit, difference lower limit, higher limit on rate of change, lower limit on rate of change.
Rate of change alarm time interval: Can be set to measurement interval × 1 to 15 (common to both rising and falling limits).
Output mode
Energize/de-energize setting, AND/OR mode setting, and output hold/non-hold setting can be made (common to all channels).
A maximum number of 6 reflash alarm output points can be specified.
Number of alarm output points
Max. 300 at subunits (up to 300 can be achieved by increasing the number of alarm modules)
Max. number of alarm modules
Up to 6 modules can be connected to a subunit (4 in case of DS400); by increasing the number of subunits, up to 30 modules can be connected.
Alarm display
Alarm status indication: Lights or flashes when an alarm is detected.
Alarm acknowledge indication: Indicator stops flashing by key operation.

SCSI Interface

Standard SCSI (Small Computer System Interface) ANSI X3. 131-1986
Connector
Half-Pitch 50-pin (pin type)
Connector pin assign ments
Unbalanced (single end) contains a terminator
Support for SCSI device
MO drive: 128/230/640 MB Semi IBM format
ZIP drive
PD drive

Standard Computation Functions

Kinds of computation

Difference between channels, linear scaling (scaling) and moving average.

Scaling

Scalable range: DC voltage, TC, RTD, contact

Scaling range: –30000 to +30000

Measurement accuracy for scaling: measurement accuracy for scaling (digits) = measurement accuracy (digits) × scaling span (digits) / measurement span (digits) + 2 digits. Numbers below the decimal point are rounded up.

(Example)

Measurement accuracy when the following settings are made:

Measuring range: 6 VDC, Measurement span: 1.000 to 5.000 V, Scaling span: 0.000 to 2.000, Measured value: 5 V

$\pm (0.05 \times 5 + 2) \times 20000/4000 + 2 = \pm 3.125$

Measurement accuracy = +/-4 digits = +/-0.004

Moving average

Moving average results for between 2 to 64 scans are computed.

Optional Math Function

Computation types

Types: Four arithmetical operations, SQR(square root), ABS(absolute value), LOG(common logarithm), LN(natural logarithm), EXP(exponent), statistical computation*1, logical computation (AND, OR, NOT, and XOR), relational computation, exponentiation, previously-measured value reference, hold*2, and reset

*1 Statistical computation

CLOG: Computation process of simultaneously measured values within a group (total, maximum, minimum, average, and maximum - minimum)

TLOG: Computation process of a specific channel over time axis (total, maximum, minimum, average, and maximum - minimum)

Statistical computation interval: Set by the event/action function

*2 Hold

Temporary suspending of computation and temporary hold of the computed result.

During statistical computation, resume the computation from the hold point after the hold is released.

Number of channels for computing (Number of channels that can be allocated for computational purposes.)

: 60 ch maximum

Computation interval

Every measurement interval (except when the computation becomes too difficult to be processed every measured interval, in which case an alarm is generated)

Significant digits during computation

$\pm 10^{308}$

Significant digits of the computed result

-9,999,999 to +99,999,999 (Decimal point can be set to have 1 to 4 digits on the right of the decimal point)

Input from communication interface

Digital value (ASCII numerical array) input from the communication interface can be handled as computational data.

Computation start/stop

Can be controlled by communication commands, M.FUNC key operation, and event/action function (such as M.FUNC key operation, remote control signal, time specified, and alarm status).

Other functions included in the math function: Remote RJC

Input type: Thermocouple (TC)

Accuracy: (Twice the measurement accuracy of the standard thermocouple input) + (temperature difference between the terminal of the remote terminal section and thermocouple section for measuring the remote terminal temperature)

Thermocouple burnout: not selectable

Report Function (feature of the suffix code /M3; this optional function will be available in the future)

Report channels
60 channels, from R01 to R60

Types of reports
Hourly report: Hourly (every hour) statistical information
Daily report: Statistical information for a day (starting at a specified time)
Monthly report: Statistical information for a month (starting at a specified date and time)
These types of report making can be turned on or off separately.

Output of the results of computing for reports
The instrument outputs the results to a communication line.

Output formats of the results of computing for reports
Hourly report: Standard format
Daily report: Standard format or enhanced format
  Standard format: results of computing daily reports
  Enhanced format: results of computing daily reports plus results of computing hourly reports*
Monthly report: Standard format or enhanced format
  Standard format: results of computing monthly reports
  Enhanced format: results of computing monthly reports plus results of computing daily reports*
The enhanced format applies to either daily reports or monthly reports only.
*: Either the average, instantaneous value or sum in each computing of a report.

Types of computing for reports
AVE: Average, maximum and minimum over a preset interval
INST: Instantaneous value at the time of report making
SUM: Sum and cumulative sum over a preset interval

	Sum	Cumulative Sum
Hourly report	Hourly sum	Sum over 24 hours (resets at the time to make up a daily report)
Daily report	Daily sum	Sum over a month (resets at the time to make up a monthly report)
Monthly report	Monthly sum	Not applicable

Unit conversion (SUM only)
When inputs over a unit of time are integrated, the unit conversion compensates for any discrepancy in the unit of value arising between computed values depending on the measurement interval applied.
INTVL: no conversion; Σ (results of computing)
/sec: converted to the sum of input in seconds; Σ (results of computing) × measurement interval
/min: converted to the sum of input in minutes; Σ (results of computing) × measurement interval/60
/hour: converted to the sum of input in hours; Σ (results of computing) × measurement interval/3600
/day: converted to the sum of input in days; Σ (results of computing) × measurement interval/86400

Time to make report
Reference dates: 1st to 28th days of a month
Reference times: 00:00 to 23:00

Output ranges of the results of computing for reports
AVE: -9999999 to 99999999 (with the position of the decimal point dependent on the measurement and computing channels assigned as report channels)
INST: -9999999 to 99999999 (with the position of the decimal point dependent on the measurement and computing channels assigned as report channels)
SUM: seven digits for the mantissa and two digits for the exponent

Processing of faulty data
AVE: Faulty data are excluded from computing. Data of positive and negative overflows, however, are included in the computing of the maximum and minimum.
INST: Faulty data are included in computing.
SUM: Faulty data are excluded from computing.

Information on and process in case of power failure

- The instrument adds × to the time on an output provided upon recovery from a power failure. It does not output the character, however, if it has been more than 12 hours since the power failure occurred.
- The instrument excludes data occurring during a power failure from its reports.
- If the instrument recovers from a power failure after the time to make a report, it makes a report immediately after the recovery.
- If a power failure time is longer than 12 hours, the instrument stops report making even if the power is restored.
  The instrument outputs a report (for data acquired up to the power failure), however, immediately after it recovers from the power failure.

Format of file

Binary
Hourly: 3634 bytes
Daily (standard): 3634 bytes
Daily (enhanced): 15346 bytes
Monthly (standard): 3634 bytes
Monthly (enhanced): 18762 bytes

Format of output via communication

Binary

Number of inputs

Stand-alone model: max. 40
Expandable model: max. 300

Periodic File

Media for data save

Buffer memory (internal SRAM)
Capacity: 1 MB (standard), 2 MB or 4 MB (option)
Data backup: Around 10 years (backup with lithium battery, at room temperature while power is off)
Memory usage: Total memory length must be within 1 MB.

Applicable data

Measured values, and computed values (only possible when optional math function is specified)

Saving to floppy disk or SCSI device

Copies data stored in the buffer memory to the floppy disk or SCSI device.

Data save format

Binary (except ASCII (CSV Format) is also possible when saving to floppy disk or SCSI device.)

Data capacity

Same as measured/computed data

Writing interval of measured/computed values

2, 3, 4, 5, 6, 10, 12, 15, 20, 30 s; 1, 2, 3, 4, 5, 10, 30, 60 min

Selection of the writing method of measured/computed values (WRITE 2 TYPE)

Repeat: Start writing the data when the key operation occurs or the trigger condition is met.
Repeat the process of writing data to 1 file, until there is no more area in the memory.
None: The periodic file is not wiriten (only for the /M3 option).

Filename when saving data

Fixed

Display

Display method

VFD (5 × 7 dot matrix, 3 rows)

Number of characters

Main display: 22 large characters (1 row); Sub-display 1 and 2: 40 small characters (2 rows)

Displayed contents

Digital value display: data for freely selected channels can be displayed on each row (1 channel per line, max. 5 rows); channel No. or tag (up to 7 characters); alarm search; measurement values; engineering unit

Bargraph display: measurement data of the main display are displayed as a bargraph

Auxiliary data: clock, alarm status, alarm relay status, keylock ON/OFF, data saving operation, file utilization, memory utilization

Alarms (when equipped with Alarm module)

Number of settings

Up to four alarms can be set for each channel.

Kind of alarms: selection from higher limit, lower limit, difference higher limit, difference lower limit, higher limit on rate of change, lower limit on rate of change.

Rate of change alarm time interval: Can be set to measurement interval × 1 to 15 (common to both rising and falling limits).

Output mode

Energize/de-energize setting, AND/OR mode setting, and output hold/non-hold setting can be made (common to all channels).

A maximum number of 6 reflash alarm output points can be specified.

Number of alarm output points

Max. 300 at subunits (up to 300 can be achieved by increasing the number of alarm modules)

Max. number of alarm modules

Up to 6 modules can be connected to a subunit (4 in case of DS400); by increasing the number of subunits, up to 30 modules can be connected.

Alarm display

Alarm status indication: Lights or flashes when an alarm is detected.

Alarm acknowledge indication: Indicator stops flashing by key operation.

SCSI Interface

Standard SCSI (Small Computer System Interface) ANSI X3. 131-1986

Connector

Half-Pitch 50-pin (pin type)

Connector pin assign ments

Unbalanced (single end) contains a terminator

Sapport for SCSI device

MO drive: 128/230/640 MB Semi IBM format

ZIP drive

PD drive

Standard Computation Functions

Kinds of computation

Difference between channels, linear scaling (scaling) and moving average.

Scaling

Scalable range: DC voltage, TC, RTD, contact

Scaling range: –30000 to +30000

Measurement accuracy for scaling: measurement accuracy for scaling (digits) = measurement accuracy (digits) × scaling span (digits) / measurement span (digits) + 2 digits. Numbers below the decimal point are rounded up.

(Example)

Measurement accuracy when the following settings are made:

Measuring range: 6 VDC, Measurement span: 1.000 to 5.000 V, Scaling span: 0.000 to 2.000, Measured value: 5 V

± (0.05 × 5 + 2) × 20000/4000 + 2 = ± 3.125

Measurement accuracy = +/-4 digits = +/-0.004 V

Moving average

Moving average results for between 2 to 64 scans are computed.

Communication Function

Communication interface is possible by GP-IB, RS-232-C, RS422-A/RS-485, or Ethernet.

Power Supply

Rated supply voltage
AC power supply: 100 to 240 VAC (freely selected)
DC power supply: 12 to 28 VDC
AC adapter: 100 to 240 VAC
Operating supply voltage
AC power supply: 90 to 250 VAC
DC power supply: 10 to 32 VDC
AC adapter: 90 to 250 VAC
Rated supply frequency
AC power supply: 50/60 Hz
AC adapter: 50/60 Hz
Power consumption
DC100 stand-alone model: max. approx. 90 VA (AC power supply or AC adapter), max. approx. 30 VA (DC power supply)
DC100 expandable model: max. approx. 90 VA (AC power supply or AC adapter), max. approx. 30 VA (DC power supply)
Subunit DS400: max. approx. 55 VA (AC power supply or AC adapter), max. approx. 25 VA (DC power supply)
Subunit DS600: max. approx. 70 VA (AC power supply or AC adapter), max. approx. 25 VA (DC power supply)
Fuse Ratings
- Main unit
  For AC power supply
  Maximum rated voltage/current: 250 V/2.5 A, Type: Time-lag, Standard: IEC/VDE
  For DC power supply
  Maximum rated voltage/current: 250 V/6.3 A, Type: Time-lag, Standard: IEC/VDE
- Subunit(The fuse may not be replaced by the customer.)
  For AC power supply
  Maximum rated voltage/current: 250 V/2 A, Type: Time-lag, Standard: IEC/VDE
  For DC power supply
  Maximum rated voltage/current: 250 V/6.3 A, Type: Time-lag, Standard: UL/CSA

Normal Operating Conditions

Supply voltage
AC power supply: 90 to 250 V AC
DC power supply: 10 to 32 V DC
AC adapter: 90 to 250 V AC
Supply frequency
50Hz ±2%, 60Hz ±2%
Ambient temperature
Main unit : 5 to 40°C
DS400/DS600 Subunit :
when desk-top use/floor installed : 0 to 50°C ,
when panel mounted/DIN rail mounted/rack mounted: –10 to 60°C
However, if the subunit DS400/DS600 is a DC power supply model, it can be used in the range from 0°C to 50°C regardless of the mounting method.
Ambient humidity
20 to 80% RH for –10 to 40°C, 10 to 50% RH for 40 to 50°C, 5 to 30% RH for 50 to 60°C (no condensation)
Vibration
10 to 60 Hz, 0.2 m/S^2
Shock
Not allowed.
Magnetic field
400 A/m max. (50/60 Hz)
Position
Unit should be positioned left-right horizontally or vertically, as a general rule.
Installation location
Room
Installation height
Altitude up to 2,000 m
Installation category based on IEC 1010-1
II*[1]
Pollution degree based on IEC 1010-1
2*[2]
Warm-up time
At least 30 minutes after power switch-on.

*[1]Installation category is the specification of the impulse withstanding voltage which is also called as overvoltage category.
*[2]Polution degree is the level of foreign body adhesion such as the solid, liquid, and gas which decreases the withstanding voltage, 2 means general indoor atmosphere.

Effect of Operating Conditions

Ambient temperature: variation for a temperature change of 10°C: within ±(0.1% of rdg + 1 digit); ±(0.2% of span + 1 digit) for Cu10 Ω
Voltage variation: within ±1 digit over the range of 90 to 132, or 180 to 250 VAC (AC power supply, frequency 50/60 Hz)/10 to 32 VDC (DC power supply)
External magnetic field: variation with respect to AC (50/60 Hz) and DC magnetic fields of 400 A/m: within ± (0.1% of rdg + 10 digits) Except for power monitor module: within ±15% of range
Signal source resistance: variation with respect to signal source resistance 1 kΩ change
(1) voltage
2 V range or below: within ±10 μV
6 V range or above: within ±0.1% of rdg
(2) thermocouple
within ±10 μV; however it must be within ±100 μV when burnout is specified.
(3) RTD
variation with respect to change of 10 Ω per wire (when all wires have the same resistance value)
indication: within ±(0.1% of rdg + 1 digit)
variation in indication with respect to a difference of 40 mΩ in the resistance between conductors (max. difference between 3 wires): approx. 0.1°C (in case of Pt100)
Mounting position
Variation when the unit is mounted horizontally on a panel: within ±(0.1% of rdg + 1 digit)
Vibration
Variation when sinusoidal vibration of acceleration 0.2 m/s^2 is applied for two hours in each of the 3 axial directions over a frequency range of 10 to 60 Hz: within ±(0.1% of rdg + 1 digit)

Transportation and Storage Conditions

These refer to the environmental conditions existing during transportation and storage from the time of shipment from the factory until commencement of use, and also during transportation and storage in the case of a temporary period of non-use.
If the environmental conditions are specified within the specified range, the unit will not incur permanent damage, and can be returned to a normal working condition (although readjustment may be required in some cases).

Ambient temperature
–20 to 60°C
Humidity
5 to 95% RH
Vibration
10 to 60 Hz, 4.9 m/s^2 max
Shock
392 m/s^2 max (in packed condition)

General Specifications

EMC conformity standard

- Emission EN55011:Class A
- Immunity EN50082-2

IEC1000-4-2	Electrostatic Discharge 8 kV(Air), 4 kV(Contact)	Performance Criteria A*
IEC1000-4-3	Radiated fields 80~1000 MHz, 10 V/m	Performance Criteria A*
IEC1000-4-4	Fast Transients Power line 2 kV, others 1 kV	Performance Criteria B
IEC1000-4-6	Conducted Disturbance 0.15~80 MHz, 10 V	Performance Criteria A*

*Effect on accuracy
Universal input module and DCV/TC/DI input module
±10% of range (except for 50 0V range)
±20% of range (50 V range)
When the extension module is used:
±20% of range (except for 50 V range)
±40% of range (50 V range)
Strain input module
±10% of range (except for 2000 με range)
±50% of range (2000 με range)
Other input modules
±10% of range

Main unit installation

Desk-top/floor installation

Rack mounting (Supplied fittings are used.)

Regardless of which installation method you use, be sure to install the units in an upright position.

Subunit installation

Floor mounting :Use the feet at the bottom of each unit.

Direct panel mounting :Screw the unit directly to the panel at the specified points.

DIN rail mounting :Use the dedicated mounting brackets.

Rack mounting :Use the dedicated mounting brackets.

Regardless of which installation method you use, be sure to install the units in an upright position.

Materials

Steel plate, aluminium plate, plastic moldings

Color

Main unit

Display: Slate Gray light (equivalent to Munsell 0.1 PB 4.6/0.2)

DC100 main unit: Ice White (equivalent to Munsell 6.6 Y 7.9/0.5)

Subunit

Slate Gray light (equivalent to Munsell 0.1 PB 4.6/0.2)

Lamp Black (equivalent to Munsell 0.8 Y 2.5/0.4)

External dimensions

DC100 stand-alone model: approx. 338 (W) × 236 (H) × 157 (D) mm

DC100 expandable model: approx. 338 (W) × 236 (H) × 157 (D) mm

Subunit DS400: approx. 336 (W) × 165 (H) × 100 (D) mm

Subunit DS600: approx. 422 (W) × 176(H) × 100 (D) mm

Weight

DC100 stand-alone model: approx. 3.5 kg*

DC100 expandable model: approx. 3.5 kg*

* with no modules installed

Subunit DS400: approx. 0.9 kg* (with 4 input modules installed: approx. 2.5 kg)

Subunit DS600: approx. 1.1 kg* (with 6 input modules installed: approx. 3.5 kg)

* with no modules installed

Clock

With calendar function

Clock accuracy

±100ppm. However, this does not include the delay (less than 1 second) caused when the power is switched ON and OFF once.

Fail/File alarm output

Contact output (at rear of main unit, one transfer contact)

Refer to 14.8 for functions/specifications.

Set value backup

Lithium battery backup (approx. 10 years, at ambient temperature of 23°C)

Insulation resistance

At least 20 MΩ between the power supply and ground, between each terminal and ground, and between each input terminal (measured with 500 VDC)

Dielectric strength

Between AC power supply terminal and ground of DC100 main unit: 1500 VAC (50/60 Hz) for one minute , Between input terminal and ground of DC100 main unit: 1500 VAC (50/60 Hz) for one minute , Between output terminal and ground of DC100 main unit: 1500 VAC (50/60 Hz) for one minute , Between DC power supply terminal and ground of DC100 main unit: 1000 VAC (50/60 Hz) for one minute

14.2 Specifications of Universal Input Module and DCV/TC/DI Input Module

Style Number: S2

Model, Number of Channels, Terminal Type and Minimum Measurement Interval

Type	Model	Number of channels	Terminal type	Minimum measurement interval
Universal input module	DU100-11	10 ch	screw	0.5 s
	DU100-12	10 ch	clamp	0.5 s
	DU100-21	20 ch	screw	2 s
	DU100-22	20 ch	clamp	2 s
	DU100-31	30 ch	screw	2 s
	DU100-32	30 ch	clamp	2 s
DCV/TC/DI input module	DU200-11	10 ch	screw	0.5 s
	DU200-12	10 ch	clamp	0.5 s
	DU200-21	20 ch	screw	2 s
	DU200-22	20 ch	clamp	2 s
	DU200-31	30 ch	screw	2 s
	DU200-32	30 ch	clamp	2 s

Input method

Floating unbalanced input, each channel mutually isolated (channel independent)
The RTD range (DU100 only) has a common potential (terminal b).

A/D resolution

±20000

A/D integration time

20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (10 Hz) or auto
(Except, auto switch does not function on the stand-alone DC power supply model or the subunit (DS400/DS600) of a DC power supply model.)

Minimum measurement interval

Filter ON/OFF / A/D integration time / number of channels	Low-pass filter OFF		Low-pass filter ON	
	20ms/16.7ms (50Hz/60Hz)	100ms (10Hz)	20ms/16.7ms (50Hz/60Hz)	100ms (10Hz)
10	0.5s*	4s	3s	12s
20	2s	5s	4s	15s
30	2s	6s	4s	20s

*2s if the power monitor module is installed.

The minimum measurement interval in a case where these modules are mixed with other input modules is the measurement interval of a module having a maximum measurement interval.

Normal operating temperature/humidity

20 to 80% RH for –10 to 40°C, 10 to 50% RH for 40 to 50°C, 5 to 30% RH for 50 to 60°C (no condensation)

Compensation for the reference junction

Switchable internally or externally for each channel.

Compensation accuracy for the reference junction

(measured at 0°C, where the input terminals are balanced)
Type R, S, B, W : ±1°C
Type K, J, E, T, N, L, U : ±0.5°C

Maximum allowable input voltage

2 V DC or lower range, TC, RTD, DI (CONT) : ±10 V DC
6 V DC or greater range, DI (LEVEL) : ±60 V DC

Normal mode voltage

Voltage, TC : 1.2 times the rated range or less (at peak value, including 50 or 60 Hz signal component)
RTD : 50 mV or lower (at peak value)

Normal mode rejection ratio

40 dB or greater (50/60 Hz ±0.1%)

Common mode noise voltage

250 V AC rms (50/60 Hz)

Common mode rejection ratio

120 dB or greater (50/60 Hz ±0.1%, 500 Ω unbalanced, between the negative measurement terminal and ground)

Maximum noise between channels

150 V AC rms (50/60 Hz)

Measurement range, accuracy and resolution

As described below, under the following operating conditions:
Ambient temperature: 23 ±2°C; ambient humidity: 55 ±10% RH; power supply voltage: 90 to 250 V AC (AC power supply)/10 to 32 V DC (DC power supply); power supply frequency: 50/60Hz within ±1% (AC power supply); warm-up time 30 minutes or more; vibrations and others not affecting instrument operation. However, RTD input is not possible for the DCV/TC/DI input module.

Input	Type	Measurement (digital display)		Maximum resolution
		Measurement range	Measurement accuracy	
DC Voltage	20 mV	–20.000 to 20.000 mV	±(0.05% of rdg. + 5 digits)	1 µV
	60 mV	–60.00 to 60.00 mV	±(0.05% of rdg. + 2 digits)	10 µV
	200 mV	–200.00 to 200.00 mV	±(0.05% of rdg. + 2 digits)	10 µV
	2 V	–2.0000 to 2.0000 V	±(0.05% of rdg. + 2 digits)	100 µV
	6 V	–6.000 to 6.000 V	±(0.05% of rdg. + 2 digits)	1 mV
	20 V	–20.000 to 20.000 V	±(0.05% of rdg. + 2 digits)	1 mV
	50 V	–50.00 to 50.00 V	±(0.05% of rdg. + 2 digits)	1 0mV
TC (Note that Accuracy of reference junction compensation is not considered).	R *1	0.0 to 1760.0°C	±(0.05% of rdg. + 1°C) However,R,S:0 to 100°C,±3.7°C 100 to 300°C,±1.5°C B:400 to 600°C,±2°C, accuracy less than 400°C is not specified.	0.1°C
	S *1	0.0 to 1760.0°C		
	B *1	0.0 to 1820.0°C		
	K *1	–200.0 to 1370.0°C	±(0.05% of rdg. +0.7°C) However,K attains an accuracy of ±(0.05% of rdg. +1°C) within the range between –200 to –100°C.	
	E *1	–200.0 to 800.0°C	±(0.05% of rdg. +0.5°C) However,J and L attain an accuracy of ±(0.05% of rdg. +0.7°C) within the range between –200 to –100°C.	
	J *1	–200.0 to 1100.0°C		
	T *1	–200.0 to 400.0°C		
	L *2	–200.0 to 900.0°C		
	U *2	–200.0 to 400.0°C		
	N *3	0.0 to 1300.0°C	±(0.05% of rdg. +0.7°C)	
	W *4	0.0 to 2315.0°C	±(0.05% of rdg. +1°C)	
	KPvsAu7Fe	0.0 to 300.0K	±(0.05% of rdg. +0.7K)	0.1K
RTD	Pt100(1mA) *5	–200.0 to 600.0°C	±(0.05% of rdg. +0.3°C)	0.1°C
	Pt100(2mA) *5	–200.0 to 250.0°C		
	JPt100(1mA) *5	–200.0 to 550.0°C		
	JPt100(2mA) *5	–200.0 to 250.0°C		
	Pt50(2mA) *5	–200.0 to 550.0°C	±(0.05% of rdg. +0.3°C)	
	Ni100(1mA) SAMA *6	–200.0 to 250.0°C	±(0.05% of rdg. +0.3°C)	
	Ni100(1mA)DIN *6	–60.0 to 180.0°C	±(0.05% of rdg. +0.3°C)	
	Ni120(1mA) *7	–70.0 to 200.0°C		
	J263*B	0.0 to 300.0K	±(0.05% of rdg. +0.3K)	0.1K
	Cu10 GE *8	–200.0 to 300.0°C	±(0.2% of rdg. +0.7°C)	0.1°C
	Cu10 L&N *8			
	Cu10 WEED *8			
	Cu10 BAILEY *8			
High resolution RTD	Pt100(1mA) *5	–140.00 to 150.00°C	±(0.05% of rdg. +0.3°C)	0.01°C
	Pt100(2mA) *5	–70.00 to 70.00°C	±(0.05% of rdg. +0.3°C)	
	JPt100(1mA) *5	–140.00 to 150.00°C	±(0.05% of rdg. +0.3°C)	
	JPt100(2mA) *5	–70.00 to 70.00°C	±(0.05% of rdg. +0.3°C)	
Contact	Voltage input	Off for a voltage of less than 2.4 V. On for a voltage of 2.4 V or more.(TTL)		
	Contact input	On/Off of contact		

*1 : R,S,B,K,E,J,T:ANSI,IEC 584,DIN IEC 584,JIS C 1602-1981
*2 : L:Fe-CuNi,DIN43710,U:Cu-CuNi,DIN 43710
*3 : N:Nicrosil-Nisil,IEC 584,DIN IEC 584
*4 : W:W·5%RE-W·26%Re (Hoskins Mfg Co)
*5 : Pt50:JIS C 1604-1981,JIS C 1606-1986
Pt100:JIS C 1604-1989,JIS C 1606-1989,IEC 751,DIN IEC 751
JPt100:JIS C 1604-1981,JIS C 1606-1989
*6 : SAMA/DIN
*7 : McGRAW EDISON COMPANY
*8 : ranges to which accuracy applies:
Cu10 GE:–84.4 to 170.0°C,
Cu10 L&N:–75.0 to 150.0°C,
Cu10 WEED:–200.0 to 250.0°C,
Cu10 BAILEY:–200.0 to 250.0°C

Noise rejection

Rejection by integration type A/D, lowpass filter, or moving averaging.

Input resistance

Min. 10 MΩ at 2 V DC or lower, thermocouple range
Approx. 1 MΩ at 6 V DC or higher.

Insulation resistance

Min. 20 MΩ at 500 V DC between the input terminal and ground.

Input bias current
Max. 10 nA

Dielectric strength
Between input terminals : 1000 V AC (50/60 Hz) for one minute
Between an input terminal and ground : 1500 V AC (50/60 Hz) for one minute

Input source resistance
DCV, TC : 2 kΩ or lower
RTD : 10 Ω or lower per line (Pt100 Ω)
5 Ω or lower per line (Pt50 Ω)
1 Ω or lower per line (Cu10 Ω)

Temperature coefficient
Zero : 0.01% of range/°C
Full span : 0.01% of range/°C (0.02% of span/°C for Cu10 Ω)

Thermocouple burnout
Detected in a thermocouple range (On/Off) enabled, current of 4 μA, detectable pulse width of approx. 5 ms
2 kΩ or lower is considered "normal."
100 kΩ or greater is considered "disconnected."

Detection interval for thermocouple burnout
2.5 sec. for a measurement period of 0.5 sec; in all other cases: each measurement interval

Detection timing for thermocouple burnout
The burnout condition is detected at each measurement interval. However, with a 10-ch universal input module connected and a measurement interval of 0.5 sec, the minimum interval of the burnout detection becomes 2.5 sec.

Power consumption
Included in the main unit or the subunit to which the module is to be installed.

External dimensions and weight

Model	External dimensions(W)×(H)×(D)mm	Weight (kg)
DU100-11	apporox. 57×137×88	0.5
DU100-12	apporox. 57×137×88	0.5
DU100-21	apporox. 114×137×88	1.0
DU100-22	apporox. 114×137×88	1.0
DU100-31	apporox. 172×137×88	1.5
DU100-32	apporox. 172×137×88	1.5
DU200-11	apporox. 57×137×88	0.5
DU200-12	apporox. 57×137×88	0.5
DU200-21	apporox. 114×137×88	1.0
DU200-22	apporox. 114×137×88	1.0
DU200-31	apporox. 172×137×88	1.5
DU200-32	apporox. 172×137×88	1.5

14.3 Specifications of mA-input Module

Style Number: S5

Model, Number of Input Channels, Terminal Type and Shortest Measurement Interval

Model	Number of Channels	Terminal Type	Shortest Measurement Interval
DU300-11	10	Screw	0.5 s
DU300-12	10	Clamp	0.5 s

The minimum measurement interval in the case where these modules are mixed with other input modules is the measurement interval of a module having the maximum measurement interval.

Method of input

Non-balanced floating input with isolation between channels (separated channels)

Resolution of A/D conversion

±20000

Integration time of A/D conversion

Manual or automatic selection between 20 ms (50 Hz), 16.7 ms (60 Hz) and 100 ms (10 Hz) (Except, auto switch does not function on the stand-alone DC power supply model or the subunit (DS400/DS600) of a DC power supply model.)

Shortest measurement interval and cutoff frequency

When the lowpass filter is turned off:

Cutoff frequency:	50/60 Hz	10 Hz
Shortest measurement interval:	0.5 s	4 s

When the lowpass filter is turned on:

Cutoff frequency:	50/60 Hz	10 Hz
Shortest measurement interval:	3 s	12 s

Normal operating temperature/humidity range

-10˚ to 60˚C

20 to 80% RH for an ambient temperature range of -10˚ to 40˚C; 10 to 50% RH for 40˚ to 50˚C; 5 to 30% RH for 50˚ to 60˚C (no condensation)

Maximum input voltage

5 V DC

Maximum normal mode noise current

24 mA (peak value, including 50- and 60-Hz signal components)

Equivalent voltage of 2.4 V

Normal mode rejection ratio (equivalent voltage)

40 dB minimum (50/60 Hz ±0.1%)

Maximum common mode noise voltage

250 V AC rms (50/60 Hz)

Common mode rejection ratio (equivalent voltage)

120 dB minimum (50/60 Hz ±0.1%)

Maximum noise across channels

150 V AC rms (50/60 Hz)

Measuring range/accuracy

Measured under the following standards of operating conditions:

Ambient temperature: 23˚ ±2˚C; ambient humidity: 55 ±10% RH; supply voltage: 90 to 250 V AC (AC power supply)/10 to 32 V DC (DC power supply); power supply frequency: 50/60 Hz ±1% (AC power supply); warm-up time: 30 minutes minimum; no effect on instrument operation due to vibration, etc.

Measuring Range	Measuring Accuracy	Maximum Resolution
-20.000 to 20.000 mA	±(0.25% of rdg. + 5 digits)	1 µA

Filter
Lowpass filter or use of moving average
Cutoff frequencies of lowpass filter: 50/60 Hz and 10 Hz and frequencies of their respective integral multiples
Input resistance
100 Ω
Insulation resistance
Across channels: 50 V DC
Across input terminals and ground: 20 MΩ minimum (500 V DC)
Withstanding voltage
Across channels: 1,000 V AC, 1 min (50/60 Hz)
Across input terminals and ground: 1,500 V AC, 1 min (50/60 Hz, excluding DU500-14)
Temperature coefficient
Zero: 0.0125% of range/°C
Span: 0.0125% of range/°C
Power consumption
Included in the value of a system's installed main unit or subunit
Dimensions
Approx. 57 (W) × 137 (H) × 88 (D) mm
Weight
Approx. 0.5 kg
Installation category (overvoltage category)
CAT II (IEC1010)

14.4 Specifications of Power Monitor Module

Model, Use (Input Channels), Terminal Type and Shortest Measurement Interval

Model	Use (Input Channels)	Terminal Type	Shortest Measurement Interval***
DU400-12	Single-phase (one channel each for voltage and current)	Clamp*	2 s
DU400-22	Three-phase (three channels each for voltage and current)	Clamp*, **	2 s

*: Two-terminal pressure clamping

**: Not usable as an equivalent to three modules of single-phase use

***: The minimum measurement interval in the case where these modules are mixed with other input modules is the measurement interval of a module having the maximum measurement interval.

Method of input

Transformer-isolated input, with isolation between channels (separated channels)

Method of measurement and computing

Digital multiplication

Measuring ranges

Voltage: 25 or 250 V rms

Current: 0.5 or 5 A

In three-phase measurement or single-phase three-wire measurement, the current/voltage ranges are identical between the respective phases or lines (the current/voltage ranges are set in common between the respective channels).

Measured frequency range

45 to 65 Hz

Wiring methods

DU400-12: Single-phase two-wire

DU400-22: Single-phase two-wire, single-phase three-wire, three-phase three-wire (dual-voltage, dual-current), three-phase three-wire (triple-voltage, triple-current) and three-phase four-wire

Measured data items

For each module, a maximum of six data items can be selected from the effective voltage, effective current, active power, apparent power, reactive power, frequency, power factor and phase angle. The selected data items can then be assigned to channel numbers xx1 to xx6 to show them on the display as well as save them. Restrictions apply to the combination of selectable data items, however, depending on the method of input wiring.

Conditions of measurement

- Measuring range for current and voltage inputs
  10% of the measuring range < current and voltage inputs ≤ 100% of the measuring range
- V1 range is monitored in frequency measurement.
- All measurements are done relative to the frequency on a channel for V1 and, therefore, the results of measurements are not guaranteed if the V1 input is out of the range noted above.
- If the input apparent power falls below 10% of the span, the instrument cannot measure the phase and power factor (negative overflow).
- A maximum of two scans' worth of data become invalid immediately after a change has been made to the measuring range and/or wiring.

Measuring accuracy and resolution

Measured under the following standards of operating conditions:
Ambient temperature: 23˚ ±2˚C; ambient humidity: 55 ±10% RH; supply voltage: 90 to 250 V AC (AC power supply)/10 to 32 V DC (DC power supply); power supply frequency: 50/60 Hz ±1% (AC power supply); warm-up time: 30 minutes minimum; no effect on instrument operation due to vibration, etc.

Measured Data Item	Measuring Accuracy	Resolution
Effective voltage	± (0.5% of SPAN)	0.01 V rms (for 25-V range), 0.1 V rms (for 250-V range)
Effective current	± (0.5% of SPAN)	0.0001 A rms (for 0.5-A range), 0.001 A rms (for 5-A range)
Active power	± (1% of SPAN) $\phi = 0$ ± (2.5% of SPAN) $0 < \lvert\phi\rvert \leq 30$ ± (5% of SPAN) $30 < \lvert\phi\rvert \leq 80$	0.01 W (for 12.5-W, 25-W and 37.5-W spans) 0.1 W (for 125-W, 250-W and 375-W spans) 1 W (for 1,250-W, 2,500-W and 3,750-W spans)
Apparent power	± (1% of SPAN) $0 \leq \lvert\phi\rvert \leq 80$	0.01 VA (for 12.5-VA, 25-VA and 37.5-VA spans) 0.1 VA (for 125-VA, 250-VA and 375-VA spans) 1 VA (for 1,250-VA, 2,500-VA and 3,750-VA spans)
Reactive power	± (5% of SPAN) $0 \leq \lvert\phi\rvert < 60$ ± (2.5% of SPAN) $60 \leq \lvert\phi\rvert \leq 80$	0.01 var (for 12.5-var, 25-var and 37.5-var spans) 0.1 var (for 125-var, 250-var and 375-var spans) 1 var (for 1,250-var, 2,500-var and 3,750-var spans)
Frequency	±0.1 Hz	0.01 Hz
Power factor	± (2% of SPAN) $0 \leq \lvert\phi\rvert \leq 80$	0.01
Phase angle	±5 deg $0 \leq \lvert\phi\rvert \leq 80$	0.1 deg

Measuring ranges

Measured Data Item	25 V-0.5A	25 V-5 A	250 V-0.5 A	250 V-5 A
Effective voltage Vi (i = 1, 2, 3, 13, 0)	0.00 to 25.00 V rms	0.00 to 25.00 V rms	0.0 to 250.0 V rms	0.0 to 250.0 V rms
Effective current Ii (i = 1, 2, 3, 13, 0)	0.0000 to 0.50000A rms	0.000 to 5.000 A rms	0.0000 to 0.5000 A rms	0.000 to 5.000 A rms
Active power P1, P2, P3	–12.50 to 12.50 W	–125.0 to 125.0 W	–125.0 to 125.0 W	–1250 to 1250 W
Active power P13	–25.00 to 25.00 W	–250.0 to 250.0 W	–250.0 to 250.0 W	–2500 to 2500 W
Active power P0	–37.50 to 37.50 W	–375.0 to 375.0 W	–375.0 to 375.0 W	–3750 to 3750 W
Apparent power VA1, VA2, VA3	0.00 to 12.50 VA	0.0 to 125.0 VA	0.0 to 125.0 VA	0 to 1250 VA
Apparent power VA13	0.00 to 25.00 VA	0.0 to 250.0 VA	0.0 to 250.0 VA	0 to 2500 VA
Apparent power VA0	0.00 to 37.50 VA	0.0 to 375.0 VA	0.0 to 375.0 VA	0 to 3750 VA
Reactive power Var1, Var2, Var3	0.00 to 12.50 var	0.0 to 125.0 var	0.0 to 125.0 var	0 to 1250 var
Reactive power Var13	0.00 to 25.00 var	0.0 to 250.0 var	0.0 to 250.0 var	0 to 2500 var
Reactive power Var0	0.00 to 37.50 var	0.0 to 375.0 var	0.0 to 375.0 var	0 to 3750 var
Power factor PFi (i = 1, 2, 3, 13, 0)	–1.00 to 1.00	–1.00 to 1.00	–1.00 to 1.00	–1.00 to 1.00
Phase PHi (i = 1, 2, 3, 13, 0)	–80.0 to 80.0 deg	–80.0 to 80.0 deg	–80.0 to 80.0 deg	–80.0 to 80.0 deg
Frequency FREQ	45.00 to 65.00 Hz	45.00 to 65.00 Hz	45.00 to 65.00 Hz	45.00 to 65.00 Hz

Ranges of indication

Measured Data Item	25 V-0.5A	25 V-5 A	250 V-0.5 A	250 V-5 A
Effective voltage Vi (i = 1, 2, 3, 13, 0)	0.00 to 26.25 A rms	0.00 to 26.25 A rms	0.0 to 262.5 A rms	0.0 to 262.5 A rms
Effective current Ii (i = 1, 2, 3, 13, 0)	0.0000 to 0.5250 A rms	0.000 to 5.250 A rms	0.0000 to 0.5250 A rms	0.000 to 5.250 A rms
Active power P1, P2, P3	–13.75 to 13.75 W	–137.5 to 137.5 W	–137.5 to 137.5 W	–1375 to 1375 W
Active power P13	–27.50 to 27.50 W	–275.0 to 275.0 W	–275.0 to 275.0 W	–2750 to 2750 W
Active power P0	–41.25 to 41.25 W	–412.5 to 412.5 W	–412.5 to 412.5 W	–4125 to 4125 W
Apparent power VA1, VA2, VA3	0.00 to 13.75 VA	0.0 to 137.5 VA	0.0 to 137.5 VA	0 to 1375 VA
Apparent power VA13	0.00 to 27.50 VA	0.0 to 275.0 VA	0.0 to 275.0 VA	0 to 2750 VA
Apparent power VA0	0.00 to 41.25 VA	0.0 to 412.5 VA	0.0 to 412.5 VA	0 to 4125 VA
Reactive power Var1, Var2, Var3	0.00 to 13.75 var	0.0 to 137.5 var	0.0 to 137.5 var	0 to 1375 var
Reactive power Var13	0.00 to 27.50 var	0.0 to 275.0 var	0.0 to 275.0 var	0 to 2750 var
Reactive power Var0	0.00 to 41.25 var	0.0 to 412.5 var	0.0 to 412.5 var	0 to 4125 var
Power factor PFi (i = 1, 2, 3, 13, 0)	–1.00 to 1.00	–1.00 to 1.00	–1.00 to 1.00	–1.00 to 1.00
Phase PHi (i = 1, 2, 3, 13, 0)	–89.0 to 89.0 deg	–89.0 to 89.0 deg	–89.0 to 89.0 deg	–89.0 to 89.0 deg
Frequency FREQ	41.00 to 69.00 Hz	41.00 to 69.00 Hz	41.00 to 69.00 Hz	41.00 to 69.00 Hz

The "-" sign of phase values means that the current is lagging behind the voltage.

Output data items of each wiring method

Output Data Item	Single-phase Two-wire	Single-phase Three-wire	Three-phase Three-wire (Dual-voltage, Dual-current)	Three-phase Three-wire (Triple-voltage, Triple-current)	Three-phase Four-wire
Effective voltage V	V1	V1, V3 V13: (V1+V3)/2	V1, V3 V13: (V1+V3)/2	V1, V2, V3 V13: (V1+V3)/2 V0: (V1+V2+V3)/3	V1, V2, V3 V0: (V1+V2+V3)/3
Effective current I	I1	I1, I3 I13: (I1+I3)/2	I1, I3 I13: (I1+I3)/2	I1, I2, I3 I13: (I1+I3)/2 I0: (I1+I2+I3)/3	I1, I2, I3 I0: (I1+I2+I3)/3
Active power W	P1	P1, P3 P13: P1+P3	P1, P3 P13: P1+P3	P1, P2, P3 P13: P1+P3	P1, P2, P3 P0: P1+I2+P3
Apparent power VA	VA1	VA1, VA3 VA13: VA1+VA3	VA1, VA3 VA13: VA1+VA3	VA1, VA2, VA3 VA13: VA1+VA3	VA1, VA2, VA3 VA0: VA1+VA2+VA3
Reactive power Var	Var1	Var1, Var3 Var13: Var1+Var3	Var1, Var3 Var13: Var1+Var3	Var1, Var2, Var3 Var13: Var1+VA3	Var1, Var2, Var3 Var0: Var1+Var2+Var3
Frequency FREQ	FREQ	FREQ	FREQ	FREQ	FREQ
Power factor PF	PF1	PF1, PF3 PF13	PF1, PF3 PF13	PF1, PF2, PF3 PF13	PF1, PF2, PF3 PF0
Phase angle PH	PH1	PH1, PH3 PH13	PH1, PH3 PH13	PH1, PH2, PH3 PH13	PH1, PH2, PH3 PH0

Continuously applicable maximum voltage and current
Voltage: 250 V rms
Current: 5 A rms
Crest factor
3 maximum (600 Vpeak)
Maximum common mode voltage
250 V rms
Common mode voltage rejection ratio (voltage and current ranges)
0.02% of span (when 250 V, 45 to 65 Hz is imposed)
Input resistance
Voltage input: 300 kΩ minimum for AC voltages
Current input: 1 Ω maximum for AC currents
Filter
Moving average
Wattage calculation
Use of /M1 computing function
Insulation resistance
Across input terminals and ground: 100 MΩ minimum
Withstanding voltage
Across output terminals and ground: 2,300 V AC (50/60 Hz), 1 min
Normal operating temperature/humidity range
0˚ to 50˚C
20 to 80% RH for an ambient temperature range of 0˚ to 40˚C; 10 to 50% RH for 40˚ to 50˚C (no condensation)
Power consumption
Included in the value of a system's installed main unit or subunit.
Dimensions
Approx. 57 (W) × 137 (H) × 99 (D) mm
Weight
Approx. 0.5 kg
Installation category (overvoltage category)
CAT II (IEC1010)

14.5 Specifications of Strain Input Module

Style Number: S5

Model, Number of Input Channels, Terminal Type, Shortest Measurement Interval and Values of Built-in Resistors

Model	Number of Input Channels	Terminal Type	Shortest Measurement Interval***	Built-in Resistor
DU500-12	10*	Clamp	0.5 s	120 Ω
DU500-13	10*	Clamp	0.5 s	350 Ω
DU500-14	10*	NDIS**	0.5 s	External

*: Requires the space of two slots.
**: Recommended by the Japanese Nondestructive Inspection Association
***: The minimum measurement interval in the case where these modules are mixed with other input modules is the measurement interval of a module having the maximum measurement interval.

Method of input

Non-balanced floating input with isolation between channels (separated channels)

Resolution of A/D conversion

Equivalent to reading on 20000 full scale

Integration time of A/D conversion

Manual or automatic selection between 20 ms (50 Hz), 16.7 ms (60 Hz) and 100 ms (10 Hz) (Except, auto switch does not function on the stand-alone DC power supply model or the subunit (DS400/DS600) of a DC power supply model.)

Types of input

Signals from strain gauge or strain-gauge sensor

Connection methods

Single-gauge, opposed-side two-gauge, adjacent-side two-gauge or four-gauge configuration (Configured with built-in DIP switches for DU500-12 and DU500-13)

Applicable gauge resistance

100 to 1,000 Ω

The DU500-12 and DU500-13 modules contain 120-Ω and 350-Ω resistors, respectively.

Bridge voltage

Fixed to 2 V DC (±5% accuracy with a correction function).

Gauges

2.00 (with scaling capability)

Balancing

Automatic

Range of balancing

Equivalent to ±10,000 με (for single-gauge method)

Measuring ranges and accuracies

Measured under the following standards of operating conditions:
Ambient temperature: 23˚ ±2˚C; ambient humidity: 55 ±10% RH; supply voltage: 90 to 250 V AC (AC power supply)/10 to 32 V DC (DC power supply); power supply frequency: 50/60 Hz ±1% (AC power supply); warm-up time: 30 minutes minimum; no effect on instrument operation due to vibration, etc.

Gauge Method	Measuring Range	Accuracy*	Resolution*
Single-gauge	–2000 to 2000 με	0.5% of Range	0.1 με
	–20000 to 20000 με	0.3% of Range	1 με
	–200000 to 200000 με	0.3% of Range	10 με
Two-gauge	–1000 to 1000 με	0.5% of Range	0.1 με
	10000 to 10000 με	0.3% of Range	1 με
	–100000 to 100000 με	0.3% of Range	10 με
Four-gauge	–500 to 500 με	0.5% of Range	0.1 με
	–5000 to 5000 με	0.3% of Range	1 με
	–50000 to 50000 με	0.3% of Range	10 με

* For the accuracy and resolution of the DU500-12 and DU500-13 models, do not include the influence of the internal- and contact-resistance of the jumper setup switch.

Accuracy of bridge resistors
±0.01%, ±5 ppm/˚C (excluding contact resistance of the jumper setup switch)
Contact resistance of the jumper setup switch
100 mΩ
Input resistance
10 MΩ minimum
Filter
Third-order sinc filter, moving-average
Withstanding voltage
Across channels: 50 V DC (except for DU500-14)
Across output terminals and ground: 1,500 V AC, 1 min (excluding DU500-14)
Normal operating temperature/humidity range
0˚ to 50˚C
20 to 80% RH for an ambient temperature range of 0˚ to 40˚C; 10 to 50% RH for 40˚ to 50˚C (no condensation)
Power consumption
Included in the value of a system's installed main unit or subunit.
Dimensions
DU500-12/DU500-13: Approx. 114.3 (W) × 137 (H) × 88 (D) mm
DU500-14: Approx. 114.3 (W) × 137 (H) × 77 (D) mm
Weight
Approx. 1 kg
Installation category (overvoltage category)
CAT II (IEC1010)
Accessory
Bridge box: 319300 (120 Ω)

14.6 Specifications of Pulse Input Module

Style Number: S4

Model, Number of Input Channels, Terminal Type and Shortest Measurement Interval

Model	Number of Channels	Terminal Type	Shortest Measurement Interval
DU600-11	10	Screw	0.5 s*

*: The interval between data updates is fixed to one second.

Method of input

Potential with reference to the shared voltage of the COMMON line within the same module

Types of input

Voltage-free contact or open collector (TTL or transistor)

Measurement modes

RATE (instantaneous count mode): Outputs the prescaled value of the count of pulses imposed over the last one-second interval of measurement.

GATE (instantaneous turn-on time mode): Outputs the prescaled values of the contact's turn-on (make) and turn-off (break) times (on = 1; off = 0) over the last one-second interval of measurement.

Note

The computing function (computational expression: TLOG.PSUM (XXX)) should be used when integrating an every-second count or turn-on time (maximum count/turn-on time: 99999999).

Input range

0 to 6,000 pulses, or 0 to 10 pulses per second (if the filter is on) for voltage-free contact input.

Ratio of make at input: 35 to 65% at the maximum frequency (ratio of make = closed-contact time/(closed-contact time + open-contact time) × 100)

Minimum input pulse width: 60 μs (whether the contact is closed or open)

Measuring accuracies

Measured under the following standards of operating conditions:

Ambient temperature: 23˚ ±2˚C; ambient humidity: 55 ±10% RH; supply voltage: 90 to 250 V AC (AC power supply)/10 to 32 V DC (DC power supply); power supply frequency: 50/60 Hz ±1% (AC power supply); warm-up time: 30 minutes minimum; no effect on instrument operation due to vibration, etc.

Count: ±1 pulse (for integration, ±(1 scan + 1 second) at the start of measurement and ±(1 scan + 1.5 seconds) at the end of measurement)

Turn-on time: ±100-ppm accuracy for judgment of one-second-interval sampling; for integration, ±(1 second + 1 scan) at the start of measurement and ±(100 ppm of rdg. + 1.5 seconds + 1 scan) at the end of measurement

Module-to-module error: ±(3 seconds + 1 pulse) for count and ±(200 ppm + 3 seconds) for turn-on time

Note

It takes a maximum of 2 seconds for normal measured values to be output when the power is turned on, when the measurement mode is changed or when the setting for turning on/off the filter is changed. The instrument indicates a value representative of "no data" (○○○○○○ on the display, or 8005H for the binary format or a faulty data value for the ASCII format in the case of output to the communication line) until the normal measured values are output.

Filter

Removes chatter of up to 5 ms (can be turned on or off on a channel basis).

Input signal levels

Open contact: 200 Ω maximum

Closed contact: 100 kΩ minimum

Normal operating temperature/humidity range

0˚ to 50˚C

20 to 80% RH for an ambient temperature range of 0˚ to 40˚C or 10 to 50% RH for 40˚ to 50˚C (no condensation)

Normal operating magnetic-field strength
400 A/m maximum
Maximum input voltage
5 V DC
Signal source rating
15 V DC, 30 mA minimum
Insulation resistance
Across input terminals and ground: 20 MΩ minimum (500 V DC)
Withstanding voltage
Across output terminals and ground: 500 V DC, 1 min (no channel-to-channel isolation)
Power consumption
Included in the value of a system's installed main unit or subunit.
Dimensions
Approx. 57 (W) × 137 (H) × 68 (D) mm
Weight
Approx. 0.3 kg
Installation category (overvoltage category)
CAT II (IEC1010)

14.7 Specifications of Digital Input Module

Style Number: S2

Model, Number of Channels, Terminal Type and Minimum Measurement Interval

Model	Number of Channels	Terminal Type	Minimum Measurement Interval
DU700-11	10	Screw	0.5s

Input method

Floating unbalanced input, each channel mutually isolated (channel independent)

A/D resolution

±20000

A/D integration time

20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (10 Hz) or auto
(Except, auto switch does not function on the stand-alone DC power supply model or the subunit (DS400/DS600) of a DC power supply model.)

Minimum measurement interval

Low-pass filter OFF

Cut-off frequency	50/60Hz	10Hz
Minimum measurement interval	0.5 s	4 s

Low-pass filter ON

Cut-off frequency	50/60Hz	10Hz
Minimum measurement interval	3 s	12 s

Normal operating temperature/humidity

20 to 80% RH for –10 to 40°C, 10 to 50% RH for 40 to 50°C, 5 to 30% RH for 50 to 60°C (no condensation)

Magnetic field

400 A/m max (50/60 Hz)

Maximum allowable input voltage

CONT (Contact input) : ±10 V DC
LEVEL (Voltage input) : ±60 V DC

Common mode noise voltage

250 V AC rms (50/60 Hz)

Maximum noise between channels

150 V AC rms (50/60 Hz)

Action

At normal operating temperature/humidity

Voltage input (LEVEL) : Off for a voltage of less than 24 V.
ON for a voltage 2.4 V or more.
Contact input (CONT) : On/Off of contact.*
*: Contact resistance ON ; 2 kΩ or less, OFF ; 100 kΩ or more

Noise rejection

Rejection by integration type A/D, lowpass filter

Cut-off frequency

50/60/10 Hz

Input resistance

CONT : Min. 10 MΩ
LEVEL : Approx. 1 MΩ

Insulation resistance

Min. 20 MΩ at 500 V DC between the input terminal and ground.

Dielectric strength

Between input terminals : 1000 V AC (50/60 Hz) for one minute
Between an input terminal and ground : 1500 V AC (50/60 Hz) for one minute

Input source resistance

LEVEL : 2 kΩ or lower

Power consumption

Included in the main unit or the subunit to which the module is to be installed.

Dimensions
Approximately 57(W) x 137(H) x 68(D) (mm)
Weight
0.5 kg
Installation Category (Overvoltage Category)
CAT II (IEC 1010)

14.8 Specifications of Alarm Module

Style Number: S2

Model, Number of outputs, Contact mode, Terminal type

Model	Number of output	Contact mode	Terminal type
DT200-11	4	Transfer contact (NO-C-NC)	screw
DT200-21	10	Make contact(NO-C)	screw

Normal operating temperature/humidity range

20 to 80% RH for 0 to 40°C, 10 to 50% RH for 40 to 50°C (no condensation)

Output updating rate

Every measurement interval

Contact mode

Make contact : normal open/common contact type

Transfer contact : normal open/common/normal close type

Energize/de-energize

Switchable

Hold/non-hold

Switchable

Reflash alarm

Up to 6 contacts can be specified.

Contact capacity

250 V DC/0.1 A (with a resistor load)

250 V AC/2 A (with a resistor load)

30 V DC/2 A (with a resistor load)

Dielectric strength

Between the output terminal and ground: 2300 V AC (50/60 Hz) for one minute.

Power consumption

Included in the main unit or the subunit to which the module is to be installed.

External dimensions and weight

Model	External dimensions(W)×(H)×(D)mm	Weight (kg)
DT200-11	apporox. 57×137×68	0.3
DT200-21	apporox. 57×137×68	0.4

14.9 Specifications of DI/DO Module

Style Number: S2

General Specifications

Terminal type
Screw
Normal operating temperature/humidity
20 to 80% RH for 0 to 40°C, 10 to 50% RH for 40 to 50°C (no condensation)
Power consumption
Included in the main unit or the subunit to which the module is to be installed.
Dielectric strength
Between input terminal (remote) and ground: 1500 V AC (50/60 Hz) for one minute.
Between output terminal (alarm/fail/file-alarm) and ground: 2300 V AC (50/60 Hz) for one minute.
External dimensions
Approx. 57 (W) × 137 (H) × 68 (D) mm
Weight
0.35 kg

DO: Alarm output

Output update rate
Every measurement interval
Contact mode
Transfer contact (NO-C-NC)
Energize/de-energize
Switchable
Hold/non-hold
Switchable
Reflash alarm
Can be set.
Contact capacity
250 V DC/0.1 A (with a resistor load)
250 V AC/2 A (with a resistor load)
30 V DC/2 A (with a resistor load)

DO: Failure output

Function
The output relay for a failure becomes de-energized when an error is detected in the system of the DC100 main unit or the DA/DR/DC subunit which is connected to the module.
Contact mode
Transfer contact (NO-C-NC)
Energize/de-energize
Not switchable
Contact capacity
250 V DC/0.1 A (with a resistor load)
250 V AC/2 A (with a resistor load)
30 V DC/2 A (with a resistor load)

DO: File-alarm Output

Function
The output relay for file-alarm becomes energized when the remaining file capacity becomes below the one corresponding to the specified time.
Contact mode
Transfer contact: normal open/common/normal close type
Energize/de-energize
Not switchable
Contact capacity
250 V DC/0.1 A (with a resistor load)
250 V AC/2 A (with a resistor load)
30 V DC/2 A (with a resistor load)

DI: Remote control of data saving functions

Function

The following functions can be controlled by contact input:
- alarm acknowledge;
- alarm reset;
- timer reset;
- message display;
- starting/stopping/clearing/resetting computation;
- starting of writing of measured/computed sata;
- suspending/resuming of writing of measured/computed data;
- trigger to start of writing of measured/computed data;
- writing of measured/computed data for one screen;
- copying of measured/computed data onto a floppy disk;
- reading of setting data.

Input signal

No voltage contact, open-collector driven by a TTL or transistor
Rated voltage:0 to 5 V DC (input impedance:4.7 kΩ, 5 V DC pull up)

Maximum input voltage (allowable range)

–2 to 7 V DC

Input conditions

- ON voltage:0.5 V max. (30 mA DC)
- Leakage current at OFF state:0.25 mA max.

Duration of input signal

One second or longer (input signal detection interval:approx. 0.5 seconds)

14.10 Specifications of Communication Interface Module

Model

Model	Description
DT300-11	GP-IB
DT300-21	RS-232-C
DT300-31	RS-422-A/RS485
DT300-41	Ethernet

General Specifications

Power consumption

Included in the main unit or the subunit to which the module is to be installed.

Normal operating temperature/humidity

20 to 80% RH for 0 to 40°C, 10 to 50% RH for 40 to 50°C(no condensation)

GP-IB Module

Style Number: S4

Electrical and mechanical specifications

Conform to IEEE Standard 488-1978.

Code

ISO (ASCII) code

Address

0 to 15

Functions

- Talker functions
  Output of measurement values (ASCII, binary); output of setting parameters (ASCII)
- Listener functions
  Setting of measurement conditions, controls of starting and stopping measurement, specifying causes of interrupts (excluding setting and control of power ON/OFF)

Causes of interrupts

Syntax error, file-end, completion of A/D conversion, operations of internal timer, end of data saving, incomplete measurement during computation

External dimensions

Approx. 57 (W) × 137 (H) × 54 (D) mm

Weight

0.3 kg

RS-232-C Module

Style Number: S8

Electrical and mechanical specifications

Conform to standard EIA RS-232-C.

Connection method

Point-to-point

Communication method

Half-duplex

Synchronization mode

Start-stop synchronization (synchronized by a start and a stop bit)

Baud rate

150, 300, 600, 1200, 2400, 4800, 9600, 19200, or 38400 bps

Start bit

Fixed at 1 bit.

Data length

7 or 8 bits, selectable

Parity

Selectable from even, odd, or none

Stop bit

1 or 2, selectable

Transmission distance

Max. 15 m

Connector

D-sub 25 pin

Handshaking
Hardware : transmission and reception control by 'DTR' 'RTS', 'CTS' signal enabled.
Software : transmission control by 'XON' and 'XOFF' enabled.
Capacity of receiving buffer
200 bytes
Escape sequence
For reception only
Functions
- Talker functions
  Output of measurement data (ASCII, binary) and setting parameters (ASCII)
- Listener functions
  Setting of measurement conditions, control of measurement start and stop (excluding the setting and control of power on/off), specifying causes of 'ESC S' (output of a status byte)

Contents of 'status'
Syntax error, file-end, completion of A/D conversion, operations of internal timer, end of data saving, incomplete measurement during computation
External dimensions
Approx. 57 (W) × 137 (H) × 54 (D) mm
Weight
0.3 kg

RS-422-A/RS485 Module

Style Number: S8
Electrical & mechanical specifications
Conform to the EIA RS-422-A and EIA RS-485 Standard.
Connection method
Multi-drop 1:n (n=16 for RS-422-A, n=31 for RS-485)
Communication method
Half duplex
Synchronization mode
Start-stop asynchronous transmission (synchronized by start/stop bit)
Baud rate (bps)
300, 600, 1200, 2400, 4800, 9600, 19200, or 38400bps (selectable)
Start bit
1 bit (fixed)
Data length
7 or 8 bits (selectable)
Parity
Even, Odd, or None (selectable)
Stop bit
1 or 2 bits (selectable)
Connector
6-point screw type terminal (uses M4 screws)
Minimum response time
0, 10, 20, 50 or 100 ms (selectable)
Reception buffer length
250 bytes
Escape sequence
Trigger, Status call, Open and Close
Electrical characteristics
SDA, SDB, RDA, RDB, SG. Between the signal terminal and the main internal circuit is insulated functionally.
Communication distance
1.2 km maximum
Terminator
Internal resistor (120 Ω, 1 W) switch with the slide switch
External dimensions
Approx. 57 (W) × 137 (H) × 68.2 (D) mm
Weight
Approx. 0.3 kg

Ethernet

Style number : S8

Electrical and Mechanical specifications

Conforms to IEEE802.3 (Frames are not supported.)

Communication method

Ethernet

Transmission specifications

10BASE-T (CSMA/CD, 10Mbps, Baseband)

Transmission speed

10 Mbps

Protocols

TCP, IP, UDP, ARP, ICMP

Maximum number of connections

4

Input data

ASCII

Supporting RS-232-C commands

Output data

ASCII, Binary

External dimensions

Approx 57(W) ×137(H) × 57(D)

Weight

0.3 kg

14.11 Specifications of the Retransmission Module

Style number: S10
Model code, number of output points, output signal, output range, terminal type

Model	Number of Output Points	Output Signal	Output Range	Terminal Type
DT500-11	10ch	1 to 5 VDC	0.8 to 5.4 VDC	screw
DT500-21	2ch	4 to 20 mADC	3.2 to 21.6 mADC	screw

Load resistance
DT500-11: 10 kΩ or more
DT500-21: 600 Ω or less
Load capacitance
0.22 mF or less
Load Inductance
100 mH or less
Output accuracy (under reference operation conditions)* * *
±0.2% of Span
Calibration period
One year
Temperature coefficient
0.01% of Span/°C
Highest resolution
DT500-11: 12 bit (approx. 1.43 mV)
DT500-21: 12 bit (approx. 5.86 mA)
Normal operating temperature/humidity
0 to 50°C
20 to 80%RH for 0 to 40°C and 10 to 50%RH for 40 to 50°C (no condensation)
Update interval of output values
Same as the measurement interval
However, depending on the number of modules that are connected, the specified computational expression, and the condition of the external storage medium, the output value may not be updated at the measurement interval.
Output during SKIP
DT500-11; 0.05 V or less
DT500-21; 0.15 mA or less
Output filter
First order low pass filter in 10 levels (time constant in the range 4 ms to 3 s) can be applied to the output value with respect to the changes in the measured data, computed data, and the communication input value.
Insulation resistance
Across output terminals and ground: 20 MΩ or more (500 VDC)
Withstand voltage
Across output terminals and ground: 500 VDC for 1 minute
Across channels
DT500-11: No insulation across channels (COM shared)
DT500-21: Insulation across channels (500 VDC, 1 minute)
Power consumption
Included in the value of the main unit or sub-unit.
Dimensions
Approximately 57(W)×137(H)×68(D) mm
Weight
DT500-11: Approximately 0.35 kg
DT500-21: Approximately 0.3 kg
Installation category (overvoltage category)
CAT II (IEC1010)

14.12 Specifications of Extension Module and Extension Base

Style Number: S5

Model

Extension module: DV100-011

Extension base: DV100-012

Units to which extension modules are connected

DS400/DS600

Input modules connectable to an extension base

Universal input modules: DU100-11 or DU100-12, 10 channels

DCV/TC/DI input modules: DU200-11 or DU200-12, 10 channels

Maximum mountable number of extension modules

One each on a subunit

Maximum connectable number of extension bases

Up to three to each extension module. It is not possible, however, to wire extension bases in such a manner that the total number of modules already mounted on the subunit and the extension bases being wired exceeds the maximum number of modules allowed for mounting on the sub-unit.

Overall length of wiring

30 m maximum

(The maximum overall length of cable measured from the extension module to the farthest extension base)

Normal operating temperature/humidity range

-10˚ to 60˚C

20 to 80% RH for an ambient temperature range of -10˚ to 40˚C; 10 to 50% RH for 40˚ to 50˚C; 5 to 30% RH for 50˚ to 60˚C (no condensation)

Insulation resistance

Depends on the input module installed.

Withstanding voltage

Depends on the input module installed.

Power consumption

Included in the value of a system's installed main unit or subunit

Dimensions

Extension module: Approx. 57 (W) × 137 (H) × 49.5 (D) mm (The dimensions do not include the support feet.)

Extension base: Approx. 114.8 (W) x 152.7 (H) x 43.7 D mm (The dimensions do not include the support feet.)
Approx. 114.8 (W) x 171.5 (H) x 143.3 (D) mm (The dimensions include the support feet.)

Weight

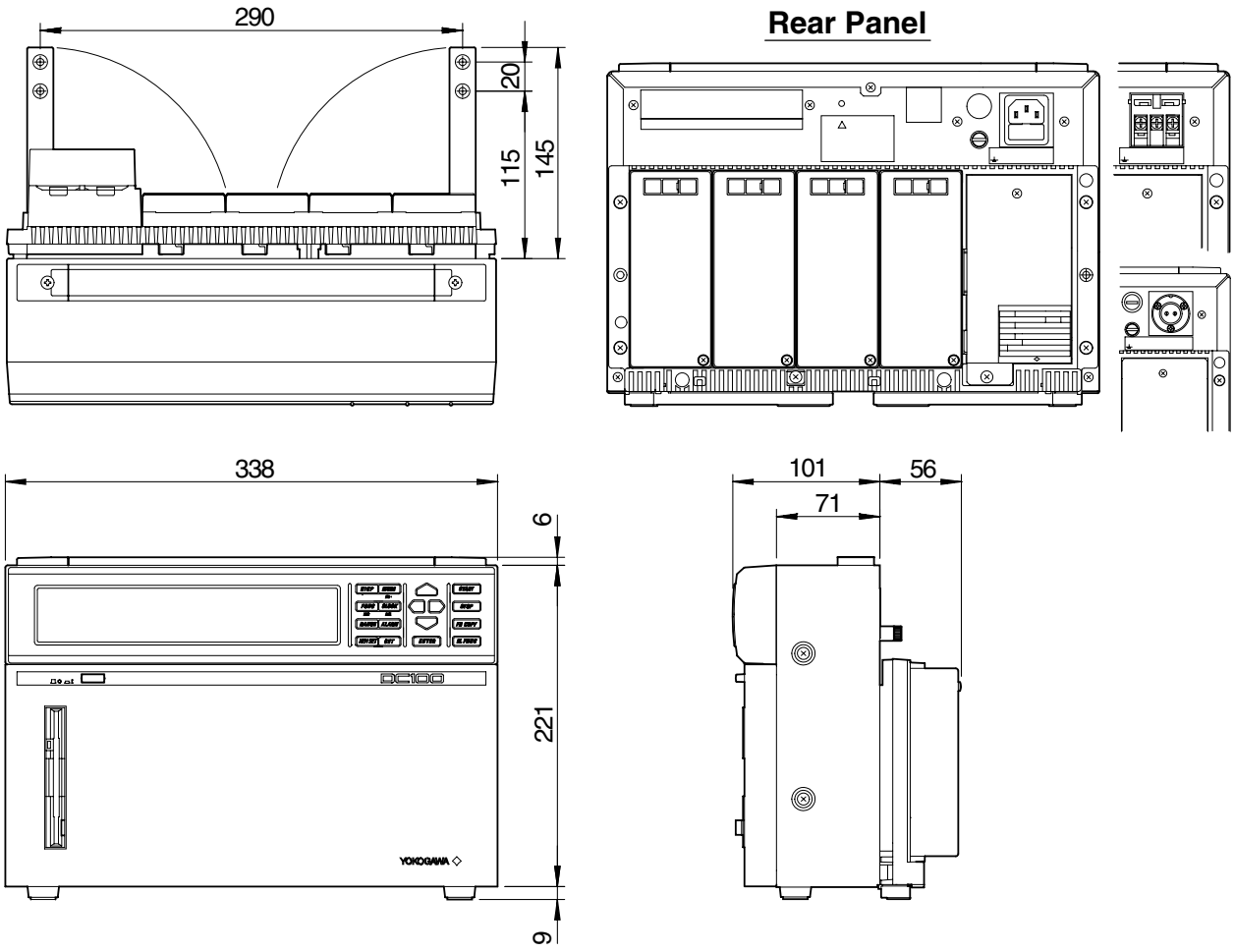
Extension module: Approx. 176 g

Extension base: Approx. 345 g

14.13 Dimensional Drawings

DC100 Stand-alone Model

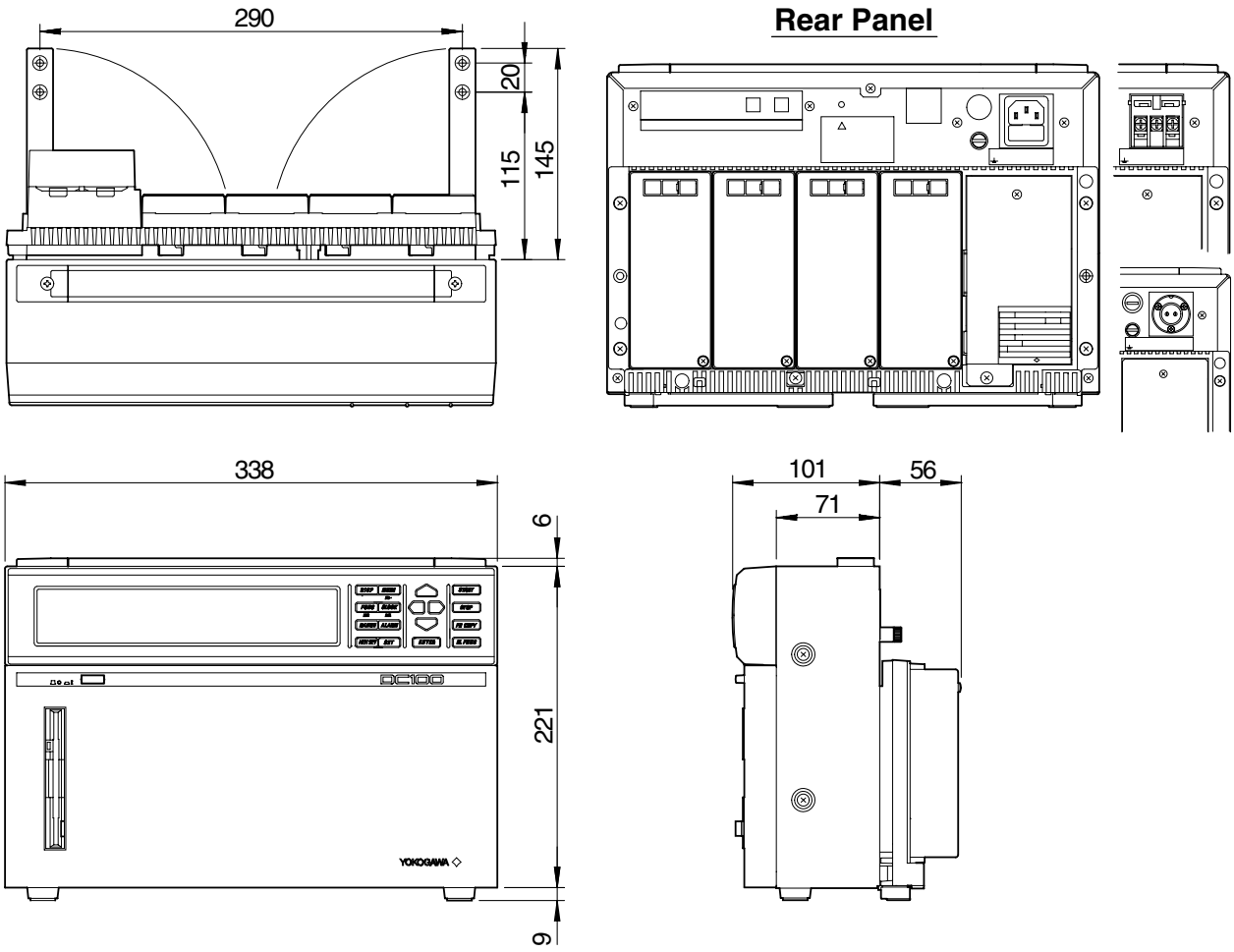
unit : mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

DC100 Expandable Model

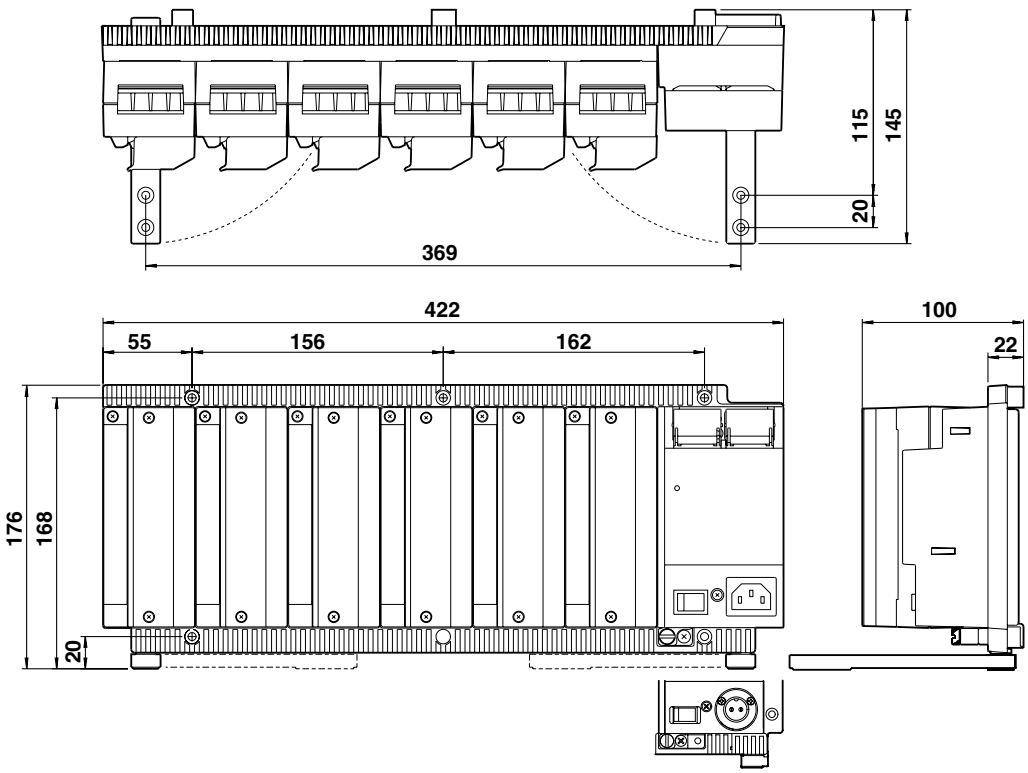
unit : mm



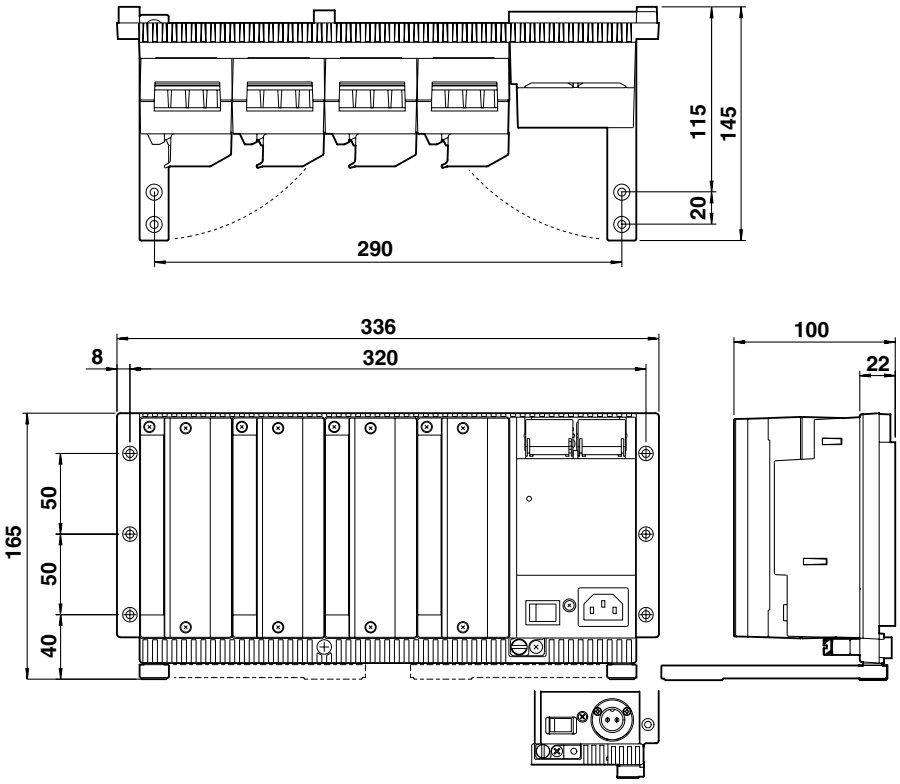
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Subunit DS600

unit : mm



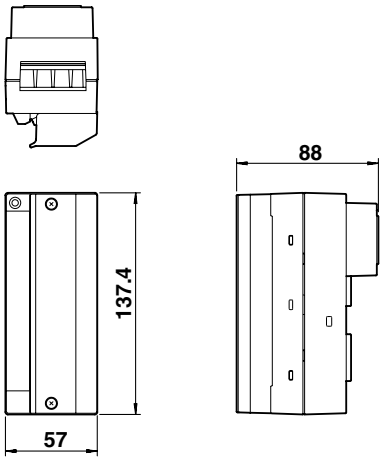
Subunit DS400



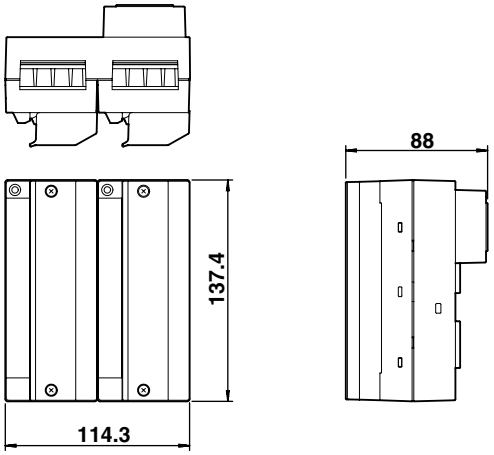
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

10-ch Universal Input Module/10-ch DCV/TC/DI Input Module/Digital Input Module

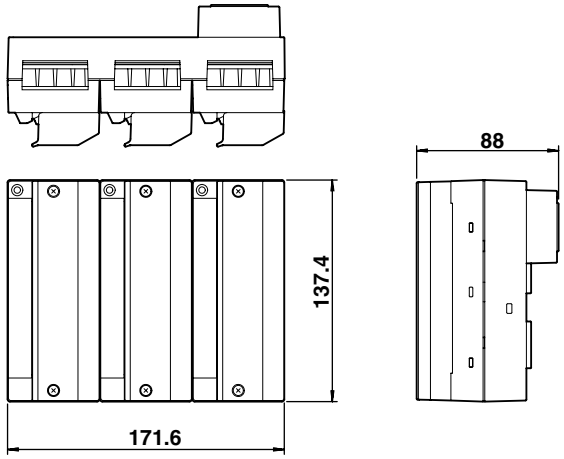
unit : mm



20-ch Universal Input Module/20-ch DCV/TC/DI Input Module



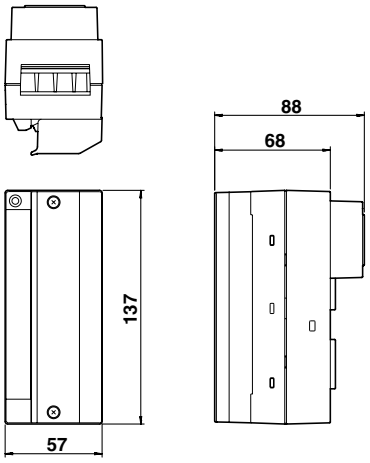
30-ch Universal Input Module/30-ch DCV/TC/DI Input Module



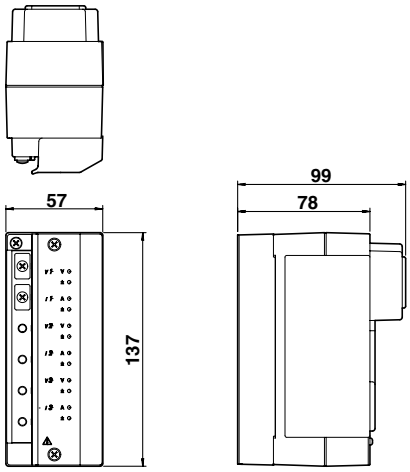
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

mA-input Module

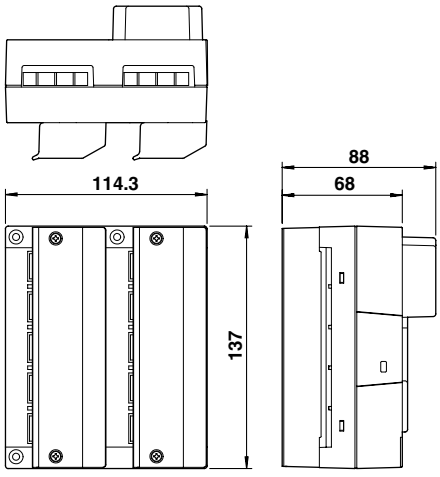
unit : mm



Power Monitor Module



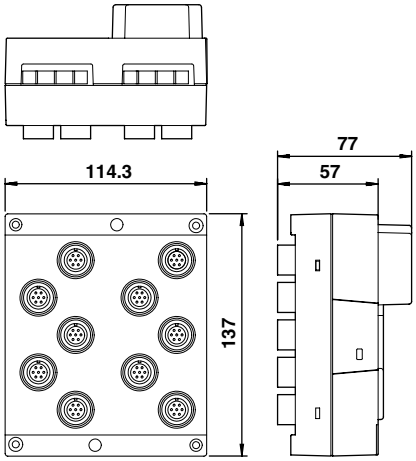
Strain Input Module (with built-in bridge resistors)



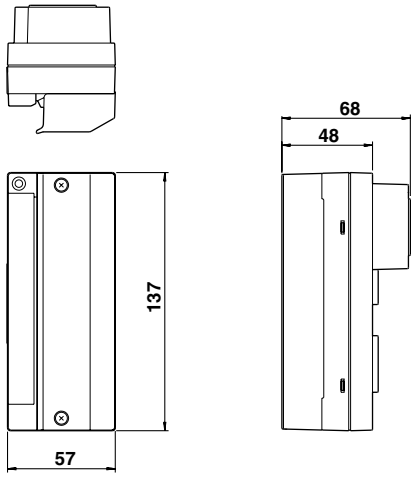
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Strain Input Module (with NDIS terminals)

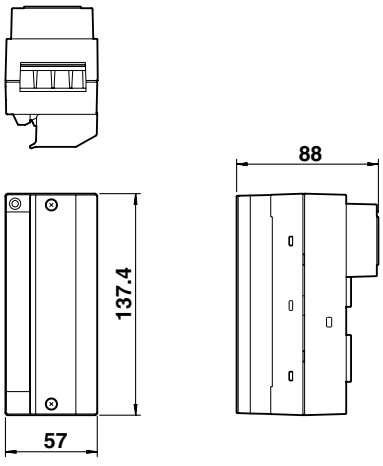
unit : mm



Pulse Input Module



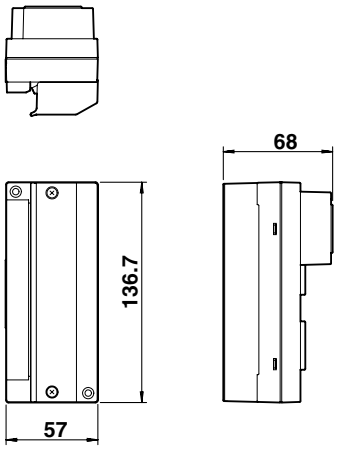
Digital input Module



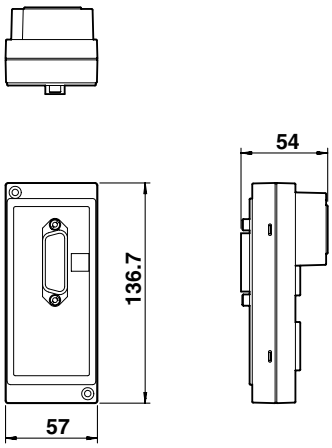
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

DI/DO Module/Alarm Module

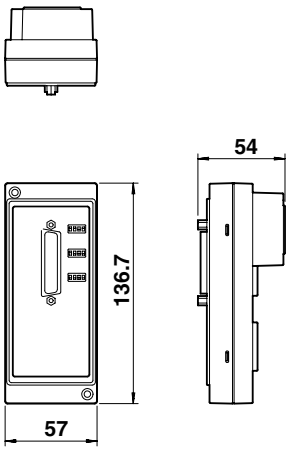
unit : mm



GP-IB Module



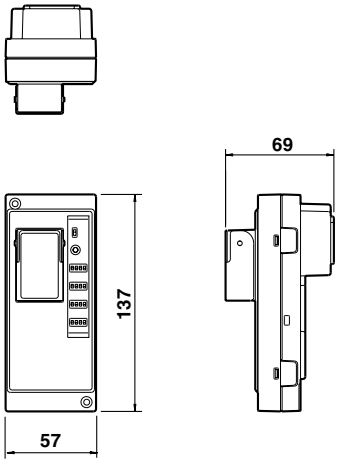
RS-232-C Module



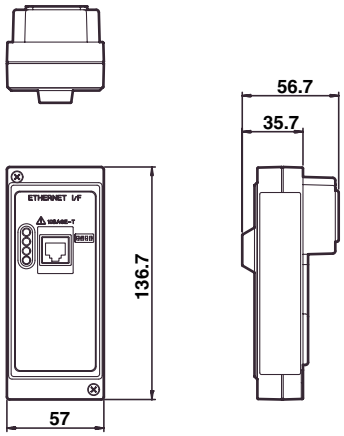
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

RS-422-A/RS-485 Module

unit : mm



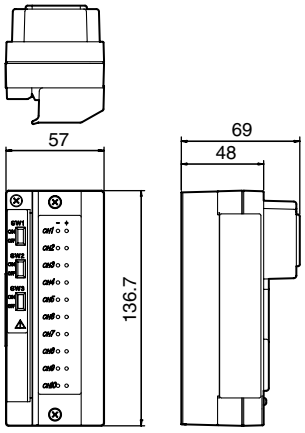
Ethernet Module



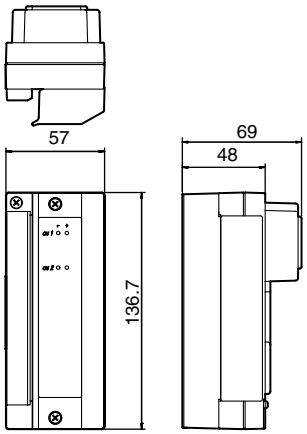
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

1-5 V Retransmission Module

unit : mm



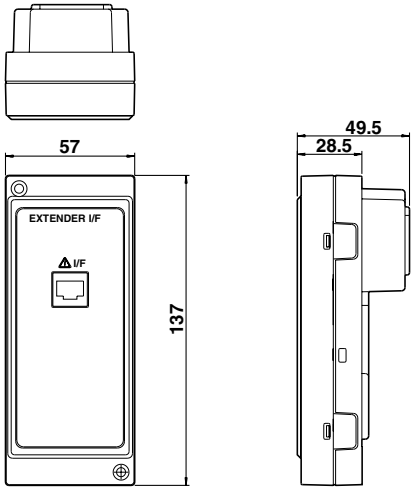
4-20 mA Retransmission Module



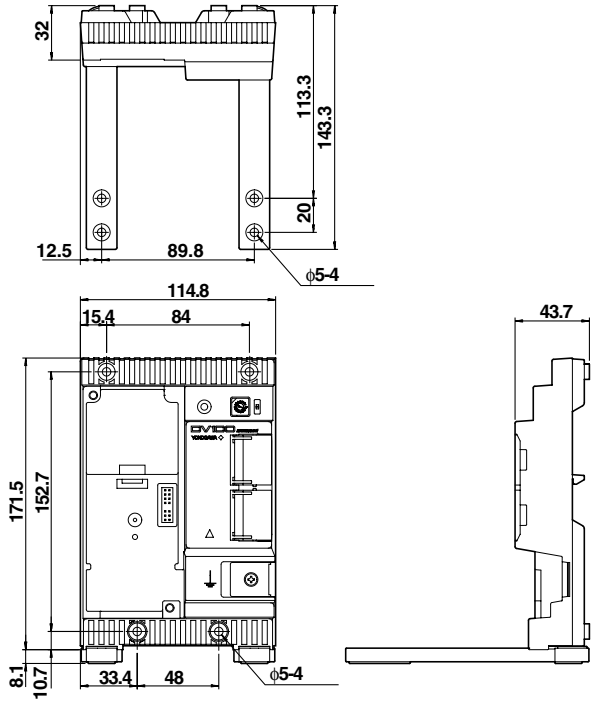
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Extension Module

unit : mm



Extension Base



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Main Menu

Pressing the relevant key, a menu (the main menu) appears in the main display. With the instrument equipped with the /M1 option, pressing the relevant key will cause a menu (the main menu) to appear in the main display.
When the alarm output and communications modules are installed and system-recognized, the main menu, indicating that alarm display hold and the relay hold functions are turned on, is displayed.

●RANGE menu

001-01:VOLT/2V→Selecting the type of input/setting the span/setting linear scaling (pages 5-1 and 5-4)

●CLOCK menu

97/06/16 03:36:23→Setting the date and time (page 3-32)

●STOP menu

WRITE STOP= [ ]

YES→Stopping of writing of measured data (page 6-1)

△/▽

PAUSE→Suspension of writing of measured data (page 6-1)

●FD COPY menu

COPY MODE=ALL→Copying of measured data (page 7-1)

●MEM SET menu

MEMORY= [ ]

CH SET→Selection of a writing channel (page 6-3)

△/▽

WR MODE→Setting of writing operation (page 6-4)

△/▽

FL INFO→Display of file information (page 7-6)

△/▽

DIR→Display of a directory (page 7-8)

△/▽

DELETE→Deletion of a data file (page 7-9)

△/▽

CONVERT→Copying after converting data to ASCII format (page 7-3)

△/▽

MEM INIT→Initialization of the built-in RAM disk (page 7-10)

●ALARM menu

001-01:1/OFF→ Setting alarms and relays (including internal switches) (page 8-1)

●SET menu

SET= [ ]

MEDIA→Saving/reading set-up data (chapter 11)

△/▽

UNIT→Setting the engineering unit (page 8-5)

△/▽

MATH→Setting computation (chapter 12)

△/▽

CONST→Setting constant (page 12-8)

△/▽

TIMER→Setting the timer (page 8-6)

△/▽

LOGIC→Setting event/action functions (page 9-1)

△/▽

CH COPY→Copying channel information (page 9-12)

●SET3 menu

SET= [ ]

TAG→Setting tags (page 8-7)

△/▽

MESSAGE→Entering messages (page 8-7)

△/▽

MATCH TIME→Setting match time (page 8-9)

△/▽

MOVE AVE→Setting moving average (page 8-9)

△/▽

GROUP→Setting groups (page 12-9)

●FUNC menu

DATA WRITE→Writing data for one scan (page 6-1)

ALARM ACK→Alarm acknowledgment (page 9-14)

ALARM RST→Alarm reset (page 9-14)

TIMER RESET→Timer reset (page 9-14)

MATH_START→Starting computation (page 12-10)

MATH_CLR_START→Re-starting computation after clearing computed data (page 12-10)

MATH_STOP→Stopping computation (page 12-10)

MATH_ACK→Clearing incomplete measurement status indication (page 12-10)

KEY LOCK ON→Keylock (page 9-14)

INIT BALANCE→Executing initial balancing (page 5-12)

REPORT START→Starting report making (page 10-23)

REPORT STOP→Stopping report making (page 10-23)

●FUNC3 menu

MODULE INF→Displaying module information (page 9-16)

COMM INF→Displaying communications information (page 9-16)

RE SYSTEM→Structuring system modules (page 3-27)

RAM INIT→Initializing RAM (page 9-16)

●SET UP menu

SET UP= [ ]

A/D INTG→Selecting A/D converter integration time (page 10-3)

SCAN INTVL→Selecting scan interval (page 10-1)

MEM SET→Setting file alarm time (page 10-10)

MEDIA→Saving/reading set-up data (chapter 11)

CH/TAG→Selecting channel number or tag indication (page 10-2)

MATH→Setting action to be carried out in case of computation error and setting the units for TLOG.SUM (page 12-14)

REPORT→Setting report format (page 10-23)

ALARM→Selecting alarm interval/hysteresis/hold (page 10-3)

FILTER→Selecting filter (page 10-3)

RELAY→Setting operation mode of relay/internal switch (page 10-5)

KEY LOCK→Setting keylock (page 10-12)

BURN OUT→Setting burn-out (page 10-8)

RJC→Setting reference junction compensation (page 10-8)

FUNC PARM→Setting FUNC/FUNC3 menu (page 10-14)

SET PARM→Setting SET/SET3 menu (page 10-17)

DISPLAY→Selecting display update interval (page 10-20)

END→Registering details set/selected with set up menu, and terminating set up menu (page 10-20)

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